Agriculture

Lower Secondary

Syllabus

Papua New Guinea
Department of Education

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Content

Secretary's message

This Lower Secondary Agriculture Syllabus is to be used by agriculture teachers to teach Lower Secondary students (Grades 9 and 10) throughout Papua New Guinea. It builds upon concepts, skills and attitudes from Upper Primary and links to concepts, skills and attitudes in the Upper Secondary. It provides a sound foundation for further learning.

Agriculture has always been extremely important to Papua New Guinea as we were among the first gardeners in the world. The Lower Secondary Agriculture Syllabus contributes directly to Papua New Guinea as it emphasises sustainability, agricultural enterprise and the use of agricultural technologies. It also contributes to the well being of Papua New Guinea people as skills in Agriculture encourage prosperity through self reliance. It links to the National Education Plan as it will enable students to achieve their individual potential to lead productive lives as members of the local, national and international community.

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The students will manage resources, promote better living and participate actively in community development through the use of agricultural knowledge and skills. They will understand the importance of sustainable land and management practices and the importance of using new agricultural technologies wisely. They will practice agricultural enterprise through undertaking practical projects. This subject depends on the initiatives, dedication and commitment from teachers, students and the community. Its success will be the evidence of the knowledge and skills students develop through undertaking practical projects in the schools and the local communities.

I commend and approve this syllabus as the official curriculum for Agriculture to be used in all schools with Grades 9 and 10 students throughout Papua New Guinea.

DR. JOSEPH PAGELIO
Secretary for Education

Introduction

The National Curriculum Statement states that Papua New Guinea has outcomes based education. All Lower Secondary Syllabuses use an outcomes based approach. The Agriculture Syllabus has been designed using learning outcomes which identify the knowledge, skills, attitudes and values that all students achieve or demonstrate by the end of Grade 10. It selects the essential knowledge and skills from syllabuses teachers have used in the past, and incorporates this with developments in agricultural learning and technology to ensure that the syllabus provides relevant skills and knowledge for students. Agriculture is part of the national curriculum learning area Culture and Community and builds on the knowledge and skills students have learnt from Making a Living.

Upper Primary Making a Living - Strands	**Lower Secondary Agriculture Strands**	**Lower Secondary Agriculture Units**
• Managing resources • Better living • Community development	• Sustainability • Agricultural technology • Agricultural enterprise.	Core • Agriculture in Papua New Guinea 1, 2 • Agriculture Production Systems in Papua New Guinea 1, 2 Options • Practical projects –growing crops, raising livestock, enterprise projects

Assessment is an important component of teaching for learning and should be integrated into these activities. Continuous assessment provides feedback to the student and the teacher on students' progress towards achievement of the learning outcomes. It helps students improve their standards of achievement by knowing what they need to do well and where they need to improve. In Agriculture, teachers will gather evidence from students' projects during the course of the term and use those continuous assessments to improve their teaching and students learning. Agriculture provides opportunities for students to assess their own learning (self-assessment) and the learning of others (peer assessment) through their projects. Teachers record evidence of students' learning throughout the project and use this to make judgments about their achievements of the learning outcomes.

The Agriculture Syllabus has been designed to be relevant by providing topics that include knowledge, skills and values that are useful for all students. The syllabus is flexible as option units are provided to allow students to study areas of interest. Option units place emphasis on

practical skills development. Academic units are taught alongside the practical ones to ensure students have the

knowledge needed to undertake the practical components. School developed units can be written to suit local community needs and resources and can be taught as part of the syllabus.

Agriculture has a strong link with the learning outcomes of the Upper Primary Syllabus, Making a Living. The skills, values, attitudes and knowledge acquired in Making a Living are related to the students' immediate surroundings. The knowledge and skills students acquire from agriculture in Grade 9 will become more complex as they progress to Grade 10.

Students will use the practical skills of agriculture to engage in different projects of their choice with assistance from their teachers. Agriculture provides knowledge that will be simple, practical and appropriate for Papua New Guinea communities. Practical activities will be based on knowledge acquired. This subject is relevant and useful for students leaving formal schooling after Grade 10, as well as those who will pursue further studies in higher institutions.

The Agriculture Syllabus has three strands relevant to the needs of the community. They are: sustainability, agricultural technology and agricultural enterprise. The strands will be blended and woven throughout the units of the syllabus.

Rationale

Historical evidence shows that early inhabitants of Papua New Guinea were among the first people to practice gardening. It is this proud cultural heritage over thousands of years, which is our source of strength. Today about 85 percent of the rural population depend on either agriculture or marine sources for their food production and income generation. Much of the urban and semi-urban population

also depend on agricultural products. This highlights the importance of safe nutritious food and food security for life sustenance in Papua New Guinea.

Through the study of Agriculture students develop appropriate knowledge and skills which enable them to contribute positively to their own lifestyle and to the local, social, cultural, economic and environmental future of the whole society. The study of the subject includes traditional and modern agriculture and horticulture as well as emerging enterprises. The dynamic nature of agriculture results from the increasing knowledge and application of current and emerging technologies to the production, processing and marketing of products. An understanding of the relationships between production, processing and consumption enables students to understand the impact of agricultural practices on society and the environment.

The syllabus develops students' ability to research, plan, organise and conduct projects, solve problems, collect and organise information and communicate information. It develops the knowledge and skills required in producing plant and animal products. It gives students the opportunity to undertake practical projects with an emphasis on enterprise, marketing and sustainability. The syllabus provides opportunity for students to make responsible decisions about the appropriate use of agricultural technologies.

At Lower Secondary, simple scientific and management concepts and practices will be integrated and built on from upper primary in order to support learning of practical management skills required by all to sustain their livelihood. Agriculture will encourage the integration of nationally accredited competency-based vocational education and training. This subject should therefore provide a basis for formal and informal employment opportunities in agriculture and its related industries and opportunities to a range of post-secondary studies and business enterprises.

Curriculum principles

The national curriculum principles should influence what students learn and how teachers teach agriculture. These principles are related to Our Way of Life, Integral Human Development and Teaching and Learning.

Our way of life

Cultural relevance

Cultural relevance focuses on the richness and diversity of Papua New Guinean cultures and languages. These cultures and languages are examined within their own unique contexts and within historical, contemporary and future realities. Our traditional life is based on a holistic perspective that integrates the past, present and future. Papua New Guineans are the original inhabitants of Papua New Guinea and live in sophisticated, organized and self-sufficient societies. Our customs and traditions constitute a cultural mosaic: rich and diverse, including different cultural groups. Our customs and traditions are unique. Agriculture therefore enables students to:

- demonstrate an understanding and appreciation of the values, customs and traditions of Papua New Guinea
- demonstrate recognition of the importance of the relationship between Papua New Guinea and the world around it.

The Agriculture Syllabus embraces traditional concepts and integrates those that are appropriate into activities that are productive and sustainable. In the teaching of Agriculture, teachers should take a balance approach where traditionally valued crops and animals are grown and raised along with introduced ones using appropriate technology.

Maintenance of vernacular language

The Department of Education's *Language Policy in all Schools* states that at the secondary level, lessons will be conducted in English, but teachers can use opportunities to further develop the students oral and written vernacular (or lingua franca) skills, for example when a concept is better explained using the vernacular or lingua franca. Students must be encouraged to learn and use English, but secondary schools should not discourage free communication in vernacular languages that the students speak in and out of the school grounds.

Cultural diversity

Papua New Guinea is fortunate to have so many languages and cultures. The diversity of our cultures is the source of our knowledge, skills, attitudes and Melanesian values. As a multicultural society, we must protect, promote and respect our many cultures and languages. There are many people from our own ethnic groups and from other countries with their own cultures, living and working together in Papua New Guinea. We must ensure that we promote and share our cultures and in this way; multiculturalism will be maintained and enjoyed while learning experiences will be enriched.

The wealth of cultural diversity in Papua New Guinea is clearly illustrated in the values placed upon certain crops and animals grown and raised in different communities throughout the country. In Agriculture teachers and students will conscientiously conserve our cultural diversity and as a result maintain our uniqueness while increasing food production to benefit the population.

Ethics, morals and values

Papua New Guinea is striving to create a society in line with democratic, liberal traditions. The citizens of Papua New Guinea should recognise appropriate social relationships based on sound human and religious ethics, morals and values. These are required for interaction with families, villages and wantoks and people from other provinces and nations. The process of socialisation requires a belief in the ethics, morals and values of the Melanesian extended family. It also requires dialogue with and respect for others, and a willingness to conserve and promote those aspects of our traditions which are consistent with integral human development. An awareness of the interdependence of individuals, societies and nations in the modern world is necessary. It requires involvement with family, church, school, community and the world beyond.

This syllabus places emphasis on ethics, morals and values in agriculture, social skills and character building to develop positive social contacts with the community.

In the teaching and learning of Agriculture, the reform emphasises the value placed on agriculture in our society. There are also work ethics agriculture students will be acquainted with, such as punctuality, consideration for others, co-operation and physical work out in the open fields.

Integral human development

Facilitating integral human development

The Agriculture Syllabus is underpinned by integral human development which is described in the National Curriculum Statement as:
integral in the sense that all aspects of a person are important

- *human* in the sense that social relationships are basic
- *development* in the sense that every individual has the potential to grow in knowledge, wisdom, understanding, skills and goodness.

Agriculture enables students to develop their potential so that each individual can solve his or her own problems, contribute to the common good of society and maintain, promote and improve earning and living opportunities.

Papua New Guinea is a rapidly changing society and faces many challenges. To face these effectively, an individual must strive to become an integrated person and to work with others to create a better community. Agriculture is an important component of this.

Nation building and national unity

Papua New Guinea is a young nation. There is still a great deal of nation building to be done. The AgricultureSyllabus enables students to understand how Papua New Guinea societies work and how they can be a useful part of these societies. Students should learn that they have a place in Papua New Guinea and that Papua New Guinea has a place in the world as a whole. They will become more able to help Papua New Guinea develop a national identity as one nation if they learn to:

- work together with tolerance
- respect one another, their traditional ways and resolve problems peacefully
- respect and act in the spirit of the National Constitution
- recognise their capabilities and develop their own talents
- participate in the development of the national community
- protect and safeguard the national wealth and resources and consider how they will contribute to national revenues.

Agriculture promotes national identity by encouraging pride in production of home-grown produce. Students investigate opportunities for farming traditional and indigenous crops and animals and participate in activities within the community that will help build Papua New Guinea as one nation.

Sustainability

The natural environment of Papua New Guinea is as diverse as its cultures. It is often a violent natural and physical environment, and threatened by issues such as rapid population expansion and misuse of resources such as over logging, abuses associated with mining, over fishing, dynamiting reefs and dumping toxic wastes. Our diverse cultures are also threatened by over exploitation and commercialisation of sacred cultural practices. Unfortunately, some of our cultural traditions, which promoted sustainability, are not being handed down from generation to generation. Agriculture will guide students to further appreciate, respect and value their natural environment, cultures, customs and traditions. It will give them the skills and knowledge to identify problems and issues and to take action to sustain these aspects of life in Papua New Guinea.

In Agriculture, we are looking at maintaining and improving land and water resources so that they can be used by the many generations to come.

Catering for diversity

Gender

All Lower SecondarySyllabuses are designed to cater for the educational needs and interests of both girls and boys. The Department of Education Gender Equity in Education Policy (2003) recommends that no student in the education system of Papua New Guinea will be disadvantaged on the basis of gender. The policy aims to prepare students for a satisfying life beyond school where:

- equal, non-violent relationships exist between females and males
- rights to personal respect and safety are reflected in everyday life
- positive cultural values and individual differences are acknowledged and respected.

To implement the policy, teachers have the responsibility to use and promote gender equity practices in their classrooms and with the wider community. This means teachers:

- use teaching and learning strategies that meet the needs and rights of all female and male students
- use gender inclusive language, content, methodology and assessment
- respect positive cultural values and challenge unfair cultural practices
- respect the contributions of men and women to society
- promote positive attitudes and behaviours of social responsibility, empathy and sensitivity.

There is a need for sensitivity to local cultural practices and values, with respect to traditional roles for males and females. In Agriculture, students will be given equal opportunities to participate in all practical learning and assessment activities regardless of gender.

In gender sensitive classrooms:

- there is a safe, challenging learning environment which is socially and culturally supportive
- boys and girls have the right to equal power
- students take turns in being the leader and reporter
- students share and participate in activities involving different students
- students show respect for other students and their contributions
- teachers encourage students to challenge stereo-typed gender roles.

Students with special needs

Many students have special needs. This includes students who are gifted and those who are disadvantaged. Gifted students should be given opportunities to extend their learning. Students with physical or intellectual impairments and emotional or learning difficulties need special support in the classroom. Teachers have a responsibility to ensure that the learning needs of these students are met. All students are individuals and all have the right to quality education in order to reach their full potential.

Agriculture caters for the needs of all students. Teachers may need to adapt learning experiences to cater for students with special needs. This syllabus promotes the principles of equity through providing a diverse range of learning experiences and fair assessment practices.

Teaching and learning

Agriculture is a practical subject and teaching and learning must reflect this. Learning will be done through projects; students will learn by doing.

Student-centred learning

The Agriculture Syllabus uses a student-centred approach as a vehicle to guide and facilitate students' learning. A student-centred approach provides students with the opportunity to practice and develop critical and creative thinking, problem solving, decision-making as well as range of practical skills and knowledge.

A student-centred approach means that teaching and learning approaches need to be flexible to cater for the individual differences and learning should be relevant and meaningful to the experiences and needs of the students. A student-centred approach allows teachers to be more flexible in determining the most effective ways to help all students achieve the learning outcomes.

Students learn in different ways. The national curriculum will encourage teachers to use different ways of teaching to give all students a chance to learn. Students work as individuals and in groups. They are encouraged to think critically about what they are learning and to take responsibility for their learning. They teach each other and learn from each other. They know that learning has a serious purpose. They enjoy using a wide range of resources and undertaking practical activities. Students also learn how to communicate well with others, how to work things out for themselves and how to get the information they need. They need to learn to think in ways that make sense, using their experiences, their knowledge, their intelligence and their imagination.

As well as learning skills and knowledge, students develop appropriate attitudes and an understanding of important issues. They have pride in themselves, their own cultures and communities, as well as respect for other people and their cultures in their communities.

Inclusive curriculum

All students are individuals and all have the right to quality education in order to reach their full potential. An inclusive curriculum uses content, language and teaching methods that take account of all students. The Agriculture Syllabus values the experiences and knowledge of all students, regardless of gender, ability, geographic location, religious and cultural background, or socio-economic status.

Teachers must ensure that the learning and assessment activities are inclusive of all students when interpreting and implementing the Agriculture Syllabus learning outcomes.

The following statements identify important requirements of an inclusive curriculum.

- All students have fair access to resources such as time spent with teacher, space in the classroom, books and equipment, outside space.
- All students have equal opportunity to participate fully in teaching, learning and assessment activities.
- The curriculum includes and addresses the needs and interests of all students; girls as well as boys, gifted students, students with disabilities and students from different cultural and religious backgrounds.

- The experiences and knowledge of all students are valued by teachers and are reflected in classroom practice.
- Teaching and learning methods cater for different learning styles by allowing students opportunities to learn in different ways.
- Teachers use a variety of assessment methods that give students opportunities to demonstrate achievement of learning outcomes.

Teachers have a responsibility to ensure that the curriculum they teach, and the classroom practices they use, give all students the opportunity to reach their full potential.

Relevance

The Lower Secondary Syllabuses should be relevant to the social, spiritual and resource development needs of a community. This can be achieved by integrating teaching and learning situations that reflect the knowledge, skills, attitudes and spiritual values needed for integral human development. A relevant Lower Secondary curriculum will prepare students for productive community living, integrate academic and practical education, and will provide ways to paid and unpaid employment.

Most people in Papua New Guinea work in the informal economy. Students who leave at the end of Grade 10 may need to find work in the informal economy. These students, however, will not only need to be skilled to work in the informal economy, but they will also need to be prepared to work in the formal economy and undertake formal education if there are opportunities. All students will need applied and academic skills and knowledge and will need to know how to adapt new technologies and knowledge appropriately to their environment.

The Agriculture Syllabus will enable teachers to support students' learning by encouraging teaching in real-life contexts. This means relating the skills and knowledge of subjects to real-life situations. People from the community could be involved in activities to help teach skills and traditional and contemporary knowledge where appropriate.

A key focus of this Agriculture Syllabus is to provide all students with real-life and relevant learning experiences. There is a clear emphasis on the development of practical skills and knowledge that will ensure students are able to achieve and maintain a sustainable way of life beyond their school years. Learning in Agriculture should provide students with opportunities to make connections with their communities and draw from their cultural, linguistic and everyday knowledge, skills and attitudes and apply these to what is being learnt in their classrooms. It is essential that students are aware of and value community and local knowledge and realise that learning takes place inside and outside the school.

Language development across the curriculum

Language development across the curriculum should be encouraged because all subject areas provide meaningful contexts for real purpose learning. Agriculture has different language requirements such as vocabulary and language features which must be explicitly taught in relevant contexts across the curriculum.

Lifelong learning

Agriculture is an important part of a student's education but learning continues throughout life. The experiences that students gain in Agriculture are critical in encouraging them to continue learning. Students know many things when they come to school. They will learn many things outside of school and continue to learn after they leave school. The curriculum should build on what students already know. Important learning in Agriculture will continue throughout life for most students.

Integration

Relevant and meaningful teaching and learning of Agriculture can be provided by integrating knowledge and skills into, or from a range of subjects such as Business Studies, Science, and Design and Technology so that practical activities or projects mimic real life situations.

The Agriculture Syllabus will provide students with opportunities to be involved in decision making about their learning, such as selection of projects and areas of interests. Students will have the opportunity to actively participate in a range of learning contexts, both school based and community based.

Safety

The Department of Education requires all teachers to have a duty of care. All students have a duty to act responsibly and safely at all times. Teachers and students must follow safety instructions and procedures at all times. The school must observe all safety requirements as instructed by the Secretary for Education.

Agriculture teachers and students must be particularly safety conscious when using tools and equipment. All tools and equipment should be well maintained and stored safely. Protective clothing must be worn when necessary and appropriate safety gear such as goggles, masks and gloves used at all times when needed.

Aims of Agriculture

To achieve the aims of Agriculture knowledge must be learnt, skills mastered and appropriate attitudes and values developed.

The aims of Agriculture are that students will:

- acquire knowledge of agricultural systems
- gain knowledge and understanding of agricultural enterprises and the practices and skills required in producing plant and animal products.
- gain an understanding of factors which affect agricultural production
- gain knowledge to plan and evaluate agricultural enterprises
- develop an understanding of agricultural issues and their importance
- acquire knowledge of methods of sustaining the land's resources and an understanding of the importance of sustainability
- recognise the significance of the contribution agriculture can make in the changing society of Papua New Guinea and the world.
- acquire a level of scientific understanding to allow them to recognise and solve problems in any environment
- live as productive citizens, caring and contributing responsibly to sustainability.

Students will develop skills through studying Agriculture such as:

- operational skills such as planting, pruning, harvesting, raising agricultural animals and fishing skills
- communication skills
- problem solving skills
- marketing skills
- critical thinking ability, and skills to make decisions based upon supported and reliable evidence
- an ability to analyse scientific findings in relation to agriculture and use these findings to increase agricultural production.

Studying Agriculture will help students build positive attitudes and values such as:

- appreciating spiritual values
- accepting responsibilities
- making decisions
- building self-confidence and self respect,
- good work ethics.

Content overview

Broad learning outcomes

The broad learning outcomes for Agriculture are statements that identify the knowledge, skills, attitudes and values all students should achieve and demonstrate at the end of Grade 10.

Students can:

1. develop and apply agricultural knowledge and skills to increase food production in sustainable ways
2. apply a range of tools, skills and techniques to agricultural enterprises
3. demonstrate knowledge of a range of plants and animals in relation to their usefulness in agriculture
4. demonstrate an understanding of agricultural systems and processes in Papua New Guinea
5. investigate, design and undertake agricultural projects that are ecologically suitable using appropriate codes and practices
6. reflect on and evaluate the project.

Strands

In the Agriculture Syllabus three strands are used from which the units are developed. They describe the dimensions of the subject and define ways of approaching learning in Agriculture. They incorporate cross-curriculum learning and skills, which are all interwoven. The strands for Agriculture are sustainability, agricultural technology and agricultural enterprise.

Sustainability

The Agriculture Syllabus focuses on social and environmental sustainability. Papua New Guinea possesses an immerse diversity of natural environments and cultures. It is essential that students develop an appreciation of this diversity and a sense of the importance of the need to protect and conserve this for use by current and future generations.

Agricultural technology

Agricultural technology refers to how the knowledge and skills of agriculture are used with appropriate technology to grow crops and raise animals.Papua New Guinea has natural resources that are not yet fully tapped by the community members because there is lack of competently skilled personnel. Although traditional technologies are appreciated,

there are limitations. The Lower Secondary Agriculture Syllabus can help students identify the major agricultural and food resource needs for Papua New Guinea people. It can provide them information and skills about agricultural technologies and use these to change their world around them. This is because students can adapt and apply appropriate new technologies in a sustainable way in order to meet their social and economical needs.

Agricultural enterprise

Agricultural enterprise is one of the major industries government relies on for economic development because it encourages cash flow to the rural population. The cash economy is sustained through this important entrepreneurial activity.

Agriculture enterprise is important in both the formal and informal economies as appropriate skills and initiative promote a culture of enterprise which improves the livelihood of the people. Small agricultural projects or enterprises at the school level result in products which can be marketed. Students are aware of the importance of enterprise throughout the Agriculture Syllabus.

Units

The content of this syllabus is organised into units. Each unit has specific learning outcomes which link with the broad learning outcomes of the subject, topics, and indications of what must be studied in each topic, assessment tasks and assessment criteria.

Some units have an academic focus and some have a practical/skills based focus. There are four core units and ten option units in Agriculture. All students must complete the four core units in sequence from Grade 9 to 10. Students must study a minimum of four option units.

Each grade has two core units, which must be taught in sequence. Core Unit 9.1 must come before Core Unit 9.2 and Core Unit 10.1 comes before Core Unit 10.2. There are a number of option units which students can choose from. Certain of the option units relate more closely to one or other of the core units. Offering the core unit and a related option unit concurrently and over two terms, allows more time for students to observe the growth cycles of the plants or animals being studied.

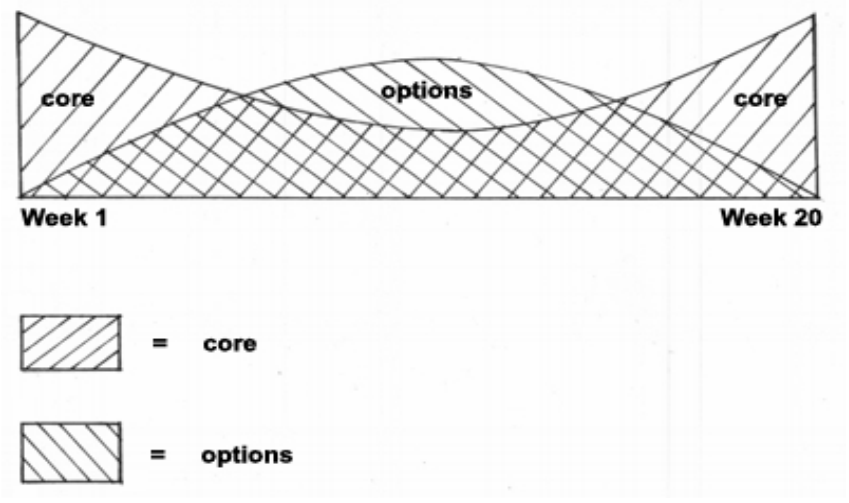
Using this model a Grade 9 program might look as follows:

Term 1 and 2	Term 3 and 4
Core unit 9.1 and choice of option units 9.3; 9.4; 9.6; or 9.9.	Core unit 9.2 and choice of option units 9.5; 9.7; 9.8 or 9.9

Similarly the grade 10 program might also be as follows:

Term 1 and 2	Term 3 and 4
Core unit 10.1 and choice of option units10.3; 10.4; or 10.7.	Core unit 10.2 and choice of option units 10.5; 10.6 or 10.7

A diagram representing integration of the core and option units



Option units 9.9 and10.7 give schools a chance to write their own school developed units depending on their needs and resources, instead of the option units that have been provided.

In the first few weeks of terms one and three, emphasis is on the core units and the theory needed before the option unit is introduced. For example four or even five of the lessons per week would concentrate on giving the students enough background information for them to be able to see the link between the core and the option units.

Given the heavy emphasis on practical (applied) learning in agriculture it would be helpful if schools could program at least one double period per week in this subject.

Personal safety must be considered a priority when students are using tools, machinery, garden equipment, plants, animals and chemicals in their learning activities. Environmental hazards as a result of chemical application will be emphasised in all appropriate units.

Agriculture is to be timetabled for five periods per week in Grades 9 and 10.

School developed units

If particular topics or contexts are not available within the syllabus the school can develop units to meet local requirements. Units are developed within the nationally accredited curriculum framework and use the broad learning outcomes of the subject. Once accredited by the Secondary Board of Studies (SBOS), school developed units can be studied in place of an option unit. In Agriculture, school developed units must relate to a core unit.

Unit learning outcomes mapped to broad learning outcomes

BLOs	1 Develop and apply agricultural knowledge and skills to increase food production in sustainable ways	2 Apply a range of tools, skills and techniques to agricultural enterprises	3 Demonstrate knowledge of a range of plants and animals in relation to their usefulness in agriculture
Core Unit 9.1	9.1.2. investigate and analyse soil properties and present findings about the essential nutrient elements		
Core Units 9.2			9.2.2 explain and identify important anatomical structures and physiological processes of animals responsible for reproduction, growth and development
Option 9.3/4		9.3.1/9.4.1 use a range of tools, skills and techniques to produce the chosen crop	
. Option 9.5		9.5.1. use a range of tools, skills and techniques to produce worms	
Option 9.6		9.61. use a range of tools, skills and techniques to raise the chosen livestock	
Option 9.7		9.7.2. use a range of tools, skills and techniques to undertake the fish farming or aquatic plants project	
Option 9.8		9.8.1 . use a range of tools, skills and techniques to construct simple agricultural machinery or equipment (or a model) 9.8.2. operate and maintain simple agricultural machinery or equipment	
Option 9.9		9.9.1. use a range of tools, skills and techniques to undertake the project	
Core 10.1	10.1.3 conduct experiments to determine soil types for growing specific crops		10.1.1recognise the economic value of crops and animals to plan and implement activities which generate and sustain an income.
Core 10.2			
Option 10.3	10.3.1 identify, analyse and describe the impact of the chosen pest or disease for the local and/or national economy		10.3.1 identify, analyse and describe the impact of the chosen pest or disease for the local and/or national economy
Option 10.4		10.4.1 use a range of tools, skills and techniques to farm wildlife	10.4.1 identify, analyse and describe the importance of the chosen wildlife species for the local and/or national economy
Option 10.5		10.5.1 use a range of tools, skills and techniques to produce flowers and ornamentals	10.5.1 identify, analyse and describe the importance of the chosen flower and landscaping for the local and/or national economy
Option 10.6		10.6.1 use a range of tools, skills and techniques to grow the chosen crop	
Option 10.7		10.7.1 use a range of skills and techniques to undertake the project	

4 Demonstrate an understanding of agricultural systems and processes in Papua New Guinea	5 Investigate, design and undertake agricultural projects that are ecologically suitable using appropriate codes and practices	6 Reflect on and evaluate the project
9.1.1describe various farming systems of Papua New Guinea and illustrate the roles of agriculture in the local economy 9.1.3.investigate and analyse the structure and functions of agricultural plant processes		
9.2.1 explain effects of agricultural activities on the ecological and economical environments 9.2.3 identify appropriate agricultural technology		9.2.1 explain effects of agricultural activities on the ecological and economical environments
	9.3.2/9.4.2 investigate, design and undertake a crop or agro-forestry project that is ecologically suitable using appropriate codes and practices.	9.3.3/9.4.3. reflect and comment on the progress of their crop or agro-forestry project.
	9.5.2. investigate, design and undertake a worm project that is ecologically suitable using appropriate codes and practices.	9.5.3 reflect and comment on the success of the worm project.
	9.6.2. investigate, design and undertake a livestock project that is ecological suitable using appropriate codes and practices	9.6.3 .reflect and comment on the success of the livestock project
	9.7.2.investigate, design and undertake an aquatic fauna or flora project that is ecologically suitable using appropriate codes and practices	9.7.4 .reflect and comment on the success of the aquatic fauna or flora project
		9.8.3. reflect and comment on the success of their construction of agricultural machinery, equipment or model
	9.9.2 investigate, design and undertake a project that is ecologically suitable using appropriate codes and practices	9.9.3 .reflect and comment on the success of the project
10.1.2 describe impacts of economic and ecological systems in Papua New Guinea and globally		10.1.3 conduct experiments &communicate information in order to determine soil types for growing specific crops
10.2.1 demonstrate an understanding of agricultural systems 10.2.2 explain the concept of interrelated systems 10.2.3 analyse a system in depth.		
	10.3.2 plan and conduct pest or disease control measures on selected crops or animals	10.3.3. evaluate the pest or disease management project
	10.4.2.investigate, design and undertake a wildlife project that is ecologically suitable using appropriate codes and practices	10.4.3.evaluate the success of the wildlife farming project
	10.5.2. investigate, design and undertake flower and ornamental production	10.5.3. evaluate the success of the project.
	10.6.2. investigate, design and undertake a project to grow a selected crop that is ecologically suitable using appropriate codes and practices	10.6.3. evaluate the success of the project.
	10.7.2 investigate, design and implement a project that is ecologically suitable using appropriate codes and practices	10.7.3 evaluate the success of the project.

Unit sequence and structure

Grade 9 units	Grade 10 units
9.1 Agriculture in Papua New Guinea 1 • PNG farming systems and role of agriculture in the national economy • Study of soil • Agriculture plant production	10.1 Agriculture in Papua New Guinea 11 • Types of agriculture industries and their effects on environment • Benefits of agriculture industries to local community • Effects of world economy on PNG agriculture • Soil management and conservation • Agricultural plant science
9.2 Agricultural Production Systems in Papua New Guinea 1 • Economic and ecological environments • Study of animal growth, development and reproduction • Livestock enterprise	10.2 Agricultural Production Systems in Papua New Guinea 11 • Agriculture bio systems • Interdependence of systems relevant to agriculture • Sustainability • Research on a single system
Option 9.3. Horticulture and Agriculture Project • Research • Project planning • Project implementation • Evaluate the project	Option 10.3. Pests and Diseases Project • Student project- pest or disease management • Principles of planning • Principles of record keeping
Option 9.4. Agricultural Forestry Project • Economic forest trees • Agricultural forestry establishment • Agricultural forestry nurseries • Planting agricultural forest trees	Option 10.4. Wildlife Farming Project • Research topic • Principles of planning • Principles of record keeping • Stages of nursery development for insects • Harvesting and marketing
Option 9.5. Worm Farming Project • Research • Project planning • Project implementation • Evaluate the project	Option 10. 5 Floriculture Project • Research topic • Principles of planning • Principles of record keeping • Stages of nursery development • Harvesting and marketing
Option 9.6. Livestock Project • Research • Project planning • Project implementation • Evaluate the project	Option 10.6. Agronomy Project • Research topic • Principles of planning • Principles of record keeping • Stages of crop development • Harvesting and marketing
Option 9.7. Aquaculture Project • Research • Project planning • Project implementation • Evaluate the project	Option 10.7. School Developed Unit
Option 9.8. Farm Technology Project • Research • Project planning • Project implementation • Operation and maintenance • Evaluate the project	
Option 9.9. School Developed Unit	

Grade 9 units

9.1 Agriculture in Papua New Guinea 1 50 periods

This unit looks at Papua New Guinea agriculture and its role in the economy in terms of food and fibre production. It also looks at ways to grow food for healthy living and sustainable use of natural resources for economic growth. Students will study basic concepts of soil and its importance to plant growth. Students analyse, interpret and discuss the effects of agricultural development on the environment. The three strands are emphasised in this unit: sustainability, agricultural enterprise and agricultural technology. This unit has an academic focus. Students' achievement of the learning outcomes will be through assessment of simple experiments, a written response and a test.

Learning outcomes

Students can:

9.1.1. describe various farming systems of Papua New Guinea and illustrate the roles of agriculture in the local economy
9.1.2. investigate and analyse soil properties and present findings about the essential nutrient elements
9.1.3. investigate and analyse the structure and functions of agricultural plant processes.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Papua New Guinea farming systems and the role of agriculture in the local economy

- brief history of farming systems in Papua New Guinea
- types of farming systems in Papua New Guinea
- government policies on food security in Papua New Guinea
- steps involve in food security programs
- effects of HIV/AIDS on sustainable food production
- roles integrated, agro-forestry and livestock systems play in Papua New Guinea economy
- impact of technology on the farming systems of Papua New Guinea

- positive and negative effects of science and technology on the farming systems in Papua New Guinea.

Study of soils

- brief introduction to soil science
- discuss the importance of soil to agriculture
- collect soil samples using proper sampling techniques to determine soil texture
- conduct simple soil tests to determine fertile and non-fertile garden soils.
- present the results of findings using appropriate presentation techniques
- soil management practices in gardens

Agriculture plant production

- observe, draw and label agricultural plants and their functions
- explain factors affecting plant growth
- carry out simple experiments on seed dormancy and germination under different conditions
- design and carry out simple experiment to demonstrate photosynthesis

Assessment

Assessment Task One

Collect work done during the unit and compile it in a folio providing evidence of the following learning:

- collecting local soil samples and investigating their properties using sight and touch
- analysing fertile and non-fertile local garden soil using sight and touch
- carrying out simple experiments on seed dormancy and germination under different conditions
- observing, drawing and labelling reproductive parts of agricultural plants
- designing and carrying out simple experiments to demonstrate photosynthesis and respiration principles.

The folio might include:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- labelled drawings and diagrams
- reports of simple experiments.

Assessment criteria

Assessment task one will be assessed on the extent to which students can demonstrate their:

- understanding of soil properties including fertility
- understanding of the knowledge and skills in conducting simple experiments
- ability to label diagrams and make correct observations
- ability to show correct techniques of simple experimentation.

60 marks

Assessment Task Two

Tests

- describe various farming systems in Papua New Guinea
- explain the importance of essential nutrient elements when taken in by the plants
- explain the structure and functions of agricultural plant processes.

Assessment criteria

Assessment task two will be assessed on the extent to which students can:

- demonstrate knowledge and understanding of various farming systems in Papua New Guinea
- demonstrate knowledge and understanding of plant nutrition in the growth of plants
- demonstrate knowledge and understanding of the structure and functions of agricultural plant processes.

40 marks

Total: 100 marks

9.2 Agricultural production systems in Papua New Guinea 1

50 periods

This unit focuses on Papua New Guinea agriculture in relation to the local, provincial and national economic and ecological environments. The students illustrate the vital processes in animal reproduction, growth and development in order to increase food production through the application of three strands: sustainability, agricultural enterprise and agricultural technology. The relationship between husbandry practices and the application of agricultural technology in achieving sustainable production are emphasised. The unit has an academic focus. Students' achievement of the learning outcomes will be assessed through an assignment and a test.

Learning outcomes

Students can:

9.2.1 explain effects of agricultural activities on the ecological and economic environments
9.2.2 explain and identify important anatomical structures and physiological processes of animals responsible for reproduction, growth and development
9.2.3 identify appropriate agricultural technology

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Economic and ecological environments

- effects of Papua New Guinea agriculture activities on:
  - local ecological environment
  - provincial ecological environment
  - national ecological environment.

- benefits on the:
  - local economy
  - provincial economy
  - national economy.

Study of animal growth, development and reproduction

- stages of growth for a range of animals:
  - fertilization
  - development
  - maturity.

Livestock enterprise

- planning, production, management and evaluation of an animal enterprise:
  - physical planning
  - financial planning.
- production stages:
  - construction of appropriate shelter, how and what
  - management aspects of enterprise
  - procedures involved in obtaining animal products
  - packaging of products
  - marketing of animal products.
- evaluation processes.

Assessment

Assessment Task One

Assignment Investigate operations of sustainable agricultural animal enterprises using:

- planning
- production
- marketing
- evaluation.

Assessment criteria

Assessment task one will be assessed on the extent to which students can:

- demonstrate understanding of proper planning stages for a livestock enterprise
- identify specific animal products to be obtained and estimate quantities of production
- explain correct evaluation procedures based on estimated costs and profits and describe likely problems.

40 marks

Assessment Task Two

Test

Describe how different types of agriculture industries link to global economic and ecological environments.

Explain anatomical structures and physiological processes of selected animals in relation to reproduction, growth and development.

Assessment criteria

Assessment task two will be assessed on the extent to which students can:

- describe and analyse ecological and economic environments using examples
- use illustrative descriptions to show anatomical structures and physiological processes of a selected animal.

Total 60 marks

Total: 100 marks

Option 9.3 Horticulture project

50 periods

Option 9.4 Agro-forestry project

50 periods

These units look at factors involved in developing and producing crops or agriculture forestry products. If studying horticultural crops, such as vegetables, or fruit, or nuts, or flowers and ornamentals, or spices, students research and plan a project. Students are made aware of problems associated with producing a crop and different physical, cultural and natural methods of managing and controlling these problems. As part of this unit, students will select and grow a horticultural crop.

If studying agriculture forestry students will cover such aspects as economic forest trees, agriculture forestry, establishing a seed tree nursery, land preparation for tree planting, harvesting techniques, product packaging, marketing and selling of the products and evaluating the project. Students are made aware of problems associated with agriculture forestry. As part of this unit, students will select and look after a forest tree such as neem trees, eucalyptus, balsa wood, rosewood, kwila, pencil cedar, yare tree, and giant lucerne. Some students will plant a tree crop and those enrolled later can harvest the products.

The strands sustainability, agricultural technology and agricultural enterprise are covered in this unit.

Students' achievement of the learning outcomes will be assessed through the production of a horticultural crop or agricultural forestry product and a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

9.3.1/9.4.1. use a range of tools, skills and techniques to produce the chosen crop

9.3.2/9.4.2. investigate, design and undertake a crop or agro-forestry project that is ecologically suitable using appropriate codes and practices

9.3.4/9.4.4. reflect and comment on the success of the crop or agro-forestry project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project - Produce a crop or agro-forestry product

Research

- research various crops or agricultural forestry products and choose one to grow
- identify the conditions and production techniques relating to the chosen crop or agro-forestry product:
  - use more than one source of information
  - compare options
  - make a choice and give reasons for the choice
  - sustainability.

Project planning

Investigation:

- physical issues - soils, climate
- financial issues - cost of production, profitability
- marketing issues- supply, demand, transport, wholesale, retail.

- plan the project and set goals

Record keeping

- identify appropriate forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entries
  - logging of growth
  - recording of weather conditions
  - visual records (such as photos, video clips)
  - regular sampling of the stages of growth of the crops.
- give evidence of reflective practice in record keeping.

Project implementation

Establishment of nursery if appropriate and techniques required:

- select nursery site
- nursery structures
- nursery equipment
- nursery soils- soil mixtures and composts
- soil preparation
- seed sowing

- conduct proper nursery management practices including:
  - water management
  - nutrients
  - diseases and pests
  - record keeping.
- hardening and transplanting seedlings

Direct planting

- select and mark site
- prepare site by weeding and preparing soil
- direct seed sowing, or transplant of seedlings
- manage:
  - water
  - nutrients
  - diseases and pests
  - record keeping.

Harvesting and marketing techniques:

- maturity indices and harvesting
- washing and packaging (crops)
- seasoning and packaging (agro-forestry)
- marketing.

Evaluate the project

- Were the goals met?
- Can the crop be sold?
- Has the crop been grown and sold at a profit?
- What did I learn?

Assessment

Assessment Task

Project

Grow a crop or agro-forestry product and produce a folio showing all the steps undertaken in the project.

The folio might include:

- rough notes or sketches
- checklists
- plans of layout of planting
- progressive records of the crop or agro- forestry product
- work samples with comments written by the teacher
- labelled drawings and diagrams
- brief reports.

Assessment criteria

Assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of crops or agricultural-forestry product
- choose an appropriate crop or agricultural forestry product to grow
- safely use a range of agricultural tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems to grow the crop or agro forestry product
- produce a crop or agro-forestry product appropriate to the available resources
- make suggestions for future improvements if appropriate
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 9.5 Worm farming project 50 periods

This unit looks at factors involved in growing different kinds of worms such as silk worms, earth worms, bait worms and others. The unit covers site selection for growing the worms, selection of worm species, field management of the worms, harvesting, packaging, marketing and selling of the products and evaluation of the project. Students are made aware of problems associated with producing worms and different physical, cultural and natural methods of managing and controlling these problems. As part of this unit, students will select worms available in the local area and grow and manage them successfully.

All key concepts of sustainability, agricultural technology and agricultural enterprise will be covered in this unit.

Students' achievement of the learning outcomes will be assessed through the production of worms or worm products and a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

9.5.1. use a range of tools, skills and techniques to produce worms
9.5.2. investigate, design and undertake a worm project that is ecologically suitable using appropriate codes and practices
9.5.3 reflect and comment on the success of the worm project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project – Produce worms

Research

- research on various economical worms and choose a type to produce
- identify the conditions and production techniques relating to the chosen worm:
  - use more than one source of information
  - compare options
  - make a choice and reasons for the choice
  - consider sustainability.

Project planning

Investigation:

- physical issues- medium of growth and climate
- financial issues- cost of production and profitability
- marketing issues- supply, demand, transport, wholesale and retail

- plan the project and set goals.

Record keeping

- identify appropriate forms of record keeping in worm production
- demonstrate the skills of continuous record keeping such as:
  - daily entry
  - logging of growth
  - visual records (photos, sketches and diagrams)
  - regular sampling of the stages of growth of the worms.
- give evidence of reflective practice in record keeping.

Project implementation

Establishment of worm farm:

- select site
- determine equipment needed
- construct housing for the worms.

Practical activities of worm production:

- establish production site
- prepare medium
- grow the worms
- manage worm production
- conduct proper management practices of the worm production site.

Harvesting and marketing techniques:

- maturity indices and harvesting
- washing and packaging of the worm products
- marketing.

Evaluate the project

- How successful was the worm project?
- Can the worm products be sold?
- Has the worm products been sold at a profit?
- What did I learn?

Assessment

Assessment Task

Project

Students must use the defined process to produce worms and develop a folio showing all the steps undertaken in the project.

The folio might include:

- rough notes or sketches
- checklists
- plans of layout of worm production site
- progressive records of the worm project.
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos
- reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of worm product
- choose an appropriate worm to produce
- safely use a range of agricultural tools, skills and techniques to produce worms
- apply knowledge and understanding of agricultural processes and systems to grow worms
- produce worms or worm products appropriate to the available resources
- make suggestions for future improvements if applicable
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 9.6 Livestock project 50 periods

In this unit each student selects and looks after an animal as a project. In the process of raising the animal, they learn about housing, fencing, breeding, feeding, product packaging, marketing and selling of the products. Livestock such as **poultry, pigs, rabbits, sheep, cattle or goats** could be chosen. Students are made aware of issues of planning a project such as:

- physical- size of livestock and shelter needs
- financial issues- cost of feed, value of meat or other products.
- marketing –supply, demand and transport
- problems associated with livestock production including diseases and suitability to climate.

These issues enable students to identify different physical, cultural and natural methods of managing and controlling these problems.

All key concepts of sustainability, agricultural technology and agricultural enterprise will be covered in this unit.

Student's achievement of the learning outcomes will be assessed through the production of livestock or livestock products and a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

9.6.1. use a range of tools, skills and techniques to raise the chosen livestock
9.6.2 investigate, design and implement a livestock project that is ecologically suitable using appropriate codes and practices
9.6.3. reflect and comment on the success of the livestock project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project – Raise the selected livestock

Research

- research on various livestock and choose one to raise

- identify the conditions and production techniques relating to the chosen livestock
- consider:
  - what livestock to be raised
  - purpose of raising the livestock
- compare options when:
  - selecting the livestock
  - timeframes
  - identify if product can be produced within the timeframe
- make a choice which livestock to raise and give reasons for the choice
- sustainability. Indicate how the project will be sustained.

Project planning

Plan the stages of the project with emphasis on:

- physical planning
  - what resources are needed and when?
  - type of equipment, materials for housing, animal feed and sanitation
  - how will the project be monitored?
- financial planning to meet the above requirements
  - how will the budget be kept?
- set goals and timelines

Record keeping

- identify appropriate forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entry
  - logging of growth
  - recording of weather conditions
  - visual records (photos, video clips,)
  - regular sampling of the stages of growth of the animals
- give evidence of reflective practice in record keeping.

Project implementation

Establishment of housing and/or fencing and techniques required:

- select housing/fencing site
- design housing/fencing structure
- identify equipment needed
- identify materials needed to raise the young
- identify feed processing techniques and schedules
- general management practices.

Practical activities related to the selected animal

- establish animal housing or fencing
- prepare brooder, roosting sites, an animal stable
- process feed for the selected livestock
- raise the selected animal
- management of the animal's needs including:
  - water
  - nutrition
  - disease and pest control
  - record keeping.
- harvest the products.

Evaluate the project

- Were the goals met?
- Has the value of the livestock or product of livestock increased?
- Could the livestock or livestock product be marketed?
- What did I learn?

Assessment

Assessment Task

Project

Students must use the defined process to raise the livestock and produce a folio showing all the steps undertaken in the project.

The folio might include:

- rough notes or sketches
- checklists
- plans of layout of livestock production site
- progressive records of the livestock project
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos
- brief reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- undertake research using a range of sources when making selection of livestock or livestock products
- safely use a range of agricultural tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems to raise the livestock
- raise the livestock or livestock products appropriate to the available resources
- make suggestions for future improvements if applicable
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 9.7 Aquaculture project

50 periods

This unit is a project on aquatic floras and faunas. Each student selects and looks after an aquatic flora or fauna. There are a number of projects to choose from such as inland fish farming, marine fish farming, estuarine/brackish water fish farming or aquatic edible herbs and weeds. Students construct ponds and tanks and stock them with fish or aquatic plants and calculate costs of materials and feed. They carry out cultural management practices, product packaging, marketing and selling of the products and evaluation of the project. Students are made aware of problems associated with looking after fish and aquatic plants or herbs and are able to identify different physical, cultural and natural methods of managing and controlling these problems. All three strands of sustainability, agricultural technology and agricultural enterprise are covered in this unit.

Students' achievement of the learning outcomes will be assessed through the production of agricultural aquatic fauna or flora and a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

9.7.1. use a range of tools, skills and techniques to undertake the fish or aquatic plants farming project
9.7.2. investigate, design and implement an aquatic fauna or flora project that is ecologically suitable using appropriate codes and practices
9.7.3. reflect and comment on the success of their chosen aquatic fauna or flora project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project – Aquatic fauna or flora (such as fish or edible aquatic plants or weeds)

Research

- research various aquatic fauna and floras and choose one to look after

- identify the conditions and production techniques relating to the chosen aquatic fauna and flora
- consider
  - what aquatic fauna and floras to look after
  - purpose of looking after the chosen aquatic fauna and floras
  - timeframes required
- compare options:
  - selecting the aquatic fauna and flora
  - establish timeframe
  - identify products that will grow in the timeframe
- make a choice and give reasons for the choice
- sustainability. Can the project be sustained?

Project planning

Plan the stages of the project with emphasis on:

- physical planning
  - resources needed and when
  - type of equipment, materials for the pond or cage and sanitation
  - how the project will be monitored
- financial planning to meet the above requirements:
  - how the budget will be kept
  - principles and skills of identifying supply and demand
- setting goals and timelines.

Record keeping

- identify various forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entry
  - logging of growth
  - recording of conditions
  - visual records (photos, video clips,)
  - regular sampling of the stages of growth of aquatic fauna and flora
- give evidence of reflective practice in record keeping.

Project implementation

Establishment of pond or cage construction and techniques required:

- select pond or fish cage construction site
- identify pond or fish cage structures
- identify equipment needed
- identify material needed for young aquatic fauna and flora
- identify feeding schedules
- product packaging

- general management practices.

Practical activities related to the selected aquatic fauna and flora:

- establish a pond or cage
- select correct aquatic fauna and aquatic flora species suitable for the local area
- raise a selected aquatic fauna or flora
- manage the project including water quality
  - nutritional level
  - diseases and pests
  - record keeping.
- harvest the products.

Evaluate the project

- Were the goals met?
- Has the value of the aquatic fauna and flora increased?
- Can the aquatic fauna and flora be marketed?
- What did I learn?

Assessment

Assessment Task

Project

Students must use the defined process to look after aquatic fauna and floras and produce a folio showing all the steps undertaken in the project.

The folio might include:

- rough notes or sketches
- checklists
- plans of the ponds or tanks
- progressive records of the project
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos
- brief reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of aquatic fauna and flora
- choose an appropriate aquatic fauna and flora to produce
- safely use a range of tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems to grow aquatic fauna and flora products
- produce aquatic fauna and flora products appropriate to the available resources
- make suggestions for future improvements if applicable
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 9.8 Farm technology project 50

In this unit, students construct different types of simple farm machinery and equipment. The unit requires students to select, use and evaluate a range of skills and materials to construct simple farm equipment used in agricultural enterprises. Some equipment will be used to process food in order to add value to the product. The unit enables students to apply knowledge and skills acquired in Design and Technology and Business Studies units to promote effective agricultural production.

All key concepts of sustainability, agricultural technology and agricultural enterprise are covered in this unit.

Students' achievement of the learning outcomes will be assessed through the production of simple farm equipment (or a model) and a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

9.8.1. use a range of tools, skills and techniques to construct simple agricultural machinery or equipment (or a model)
9.8.2. operate and maintain simple agricultural machinery or equipment
9.8.3. reflect and comment on the success of their construction of agricultural machinery, equipment (or model).

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project – Constructing appropriate farm equipment

Research

- research various farm machinery or equipment and choose one to construct. Those used for food processing can be included.
- identify mechanical and operational features of the chosen farm machinery or equipment:
  - use more than one source of information
  - compare options
  - make a choice and give reasons for the choice.
- sustainability. Indicate how the project will be sustained.

Project planning

Planning to construct an appropriate piece of farm machinery or equipment should include:

- physical planning
  - what resources needed and when
  - how will the project be monitored?
- financial planning to meet the above requirements
  - how will the budget be kept?
  - principles and skills of identifying supply and demand of the chosen farm machinery or equipment.
- setting goals and timelines.

Record keeping:

- identify appropriate forms of record keeping for constructing farm machinery or equipment:
  - demonstrate the skills of continuous record keeping
  - visual records (sketches, diagrams or photos).
- give evidence of reflective practice in record keeping.

Project implementation

Techniques for construction of appropriate farm equipment:

- select the equipment to be constructed
- make a design of the appropriate farm equipment (construction of pulleys, making wheel barrows, brick construction, dam construction)
- list the equipment needed for the construction
- collect the materials needed for equipment construction
- identify stages of construction
- use the constructed equipment, for example to process food in order to add value
- be aware of general safety practices (safety in the use of the equipment, personal safety and environmental safety).

Students make appropriate farm equipment or machinery (or a model) selected.

Marketing

- packaging if appropriate
- marketing if appropriate.

Operation and maintenance

- ensure machinery is maintained at all times
- be aware of licensing requirements for operation of machinery.

Evaluate the project

- Were the goals met?
- Has the equipment any value?
- Can the equipment be marketed?
- What did I learn?

Assessment

Assessment Task - Project

Students must use the defined process to construct agricultural machinery or equipment and produce a folio showing all the steps undertaken in the project. The folio might include:

- rough notes or sketches
- checklists
- plans
- progressive records of the project
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos
- brief reports.

In the folio students will provide evidence of:

- research using more than one information source to justify why the particular agricultural machinery or equipment was selected
- effective planning
- identifying the principles relevant to the farm machinery or equipment chosen
- following logical processes to construct the machinery or equipment
- researching and identifying a market
- awareness of the value of the product
- reflecting on what they learnt from the project.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of agricultural machinery and equipment
- choose appropriate agricultural machinery or equipment and plan its construction
- safely use a range of agricultural tools, skills and techniques to produce simple agricultural machinery or equipment
- apply knowledge and understanding of processes and systems to make agricultural equipment
- construct simple farm equipment or machinery suitable to available resources
- make suggestions for future improvements if applicable.

Total: 100 marks

Option 9.9 School developed unit 50 periods

School developed Agriculture units are based on student interest and resources available in the local area. Schools develop a unit relevant to their community and students, using the project approach, for example: Palm Oil Project, Coffee Production, Piggeries Project, Poultry Production, Rice Project. The school developed unit encourages students to select, use and evaluate a range of agricultural skills and equipment to be used in the agricultural enterprise.

All key concepts of sustainability, agricultural technology and agricultural enterprise must be covered in the school developed unit.

Students' achievement of the learning outcomes will be assessed through assessment of the process and product and a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

9.9.1. use a range of tools, skills and techniques to undertake the project
9.9.2. investigate, design and undertake a project that is ecologically suitable using appropriate codes and practices
9.9.3. reflect and comment on the success of their project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project –

- research agricultural activities relevant to the local area and choose one
- identify the conditions and production techniques relating to the chosen activity
- consider:
  - what agriculture activity to undertake
  - purpose of undertaking the chosen activity
  - timeframes required
  - options and compare
- selecting the agriculture activity/enterprise:
  - establish timeframe
  - identify products that will grow and can be raised in the timeframe

- make a choice and give reasons for the choice
- sustainability. Can the project be sustained?

Project planning

Plan the stages of the project with emphasis on:

- physical planning
  - resources needed and when
  - type of equipment, materials required
  - how the project will be monitored.
- financial planning to meet the above requirements
  - how the budget will be kept
  - principles and skills of identifying supply and demand
- setting goals and timelines.

Record Keeping

- identify appropriate forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entry
  - logging of growth
  - recording of conditions
  - visual records (photos, video clips,)
  - regular sampling of the stages of growth.
- give evidence of reflective practice in record keeping.

Project implementation

Establishment of project and techniques required to undertake the project:

- site for project
- identify structures required such as a fence, pen, cage
- identify equipment needed
- identify material needed
- identify feeding schedules
- product packaging
- general management practices.

Practical activities related to the selected project:

- establishment of any required structure
- select and acquire correct species suitable for the local area
- raise or grow the selected crop or animal
- manage the project including
  - water quality or availability

  - nutritional level
  - diseases and pests
  - record keeping
- harvest the products.

Evaluate the project

- Were the goals met?
- Has the value of the product increased?
- Can the product be marketed?
- What did I learn?

Assessment

Assessment Task

Project

Students must use the defined process to complete the chosen project and produce a folio showing all the steps undertaken in the project.

The folio might include:

- rough notes or sketches
- checklists
- plans
- progressive records of the project
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos
- brief reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of agricultural product
- choose an appropriate product to produce
- safely use a range of tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems
- produce products appropriate to the available resources
- make suggestions for future improvements if applicable
- communicate ideas and information in a variety of ways.

Total: 100 marks

Grade 10 units

10.1 Agriculture in Papua New Guinea 2 — 50 periods

This unit focuses on the major agricultural industries of Papua New Guinea as systems. Students will identify types of agricultural industries and discuss how these industries affect the natural environment. The unit requires students to suggest ways to encourage sustainable agriculture practices in the local and global economy.

Students will demonstrate their understanding of economic and ecological systems, soil use and conservation, crop and animal husbandry practices and the use of technological innovations.

Students will learn how different factors in the whole agriculture system are interrelated and suggest ways to grow crops and raise animals for cash using agricultural technological skills in a sustainable enterprise. The three strands sustainability, agricultural enterprise and agricultural technology are covered in this unit.

Students' achievement of the learning outcomes will be through an advanced investigation and a written assignment.

Learning outcomes

Students can:

10.1.1 recognise the economic value of crops and animals which generate and sustain an income
10.1.2 describe impacts of economic and ecological systems in Papua New Guinea and globally
10.1.3 conduct experiments to determine soil types for growing specific crops.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Types of agro-industries and their effects on the environment, societies and communities

- describe types of agricultural industries in Papua New Guinea such as:
  - Ramu Sugar
  - Kurumul Tea

  - West New Britain Oil Palm Estate
  - Higaturu Oil Palm Estate
- discuss effects of agriculture industries on:
  - ecosystems
  - wastes and disposal systems
  - recycling of waste products.

Benefits of agro-industries to local economy

- identify contributions of agricultural industries to the local community in terms of:
  - food security
  - poverty alleviation
  - enhance nutritional status
  - income generation opportunities.

Effects of world economy on Papua New Guinea agriculture

- discuss effects of world economy on Papua New Guinea agriculture
  - market prices
  - stabilization funds

Soil management and conservation

- conduct experiments to determine soil types for specific crops
- understand principles of soil conservation in agriculture such as:
  - avoid working on the soil when wet
  - use lots of organic matter with moderate use of chemical fertilizers
  - use fallow method
  - grow green manure crops and apply them back into the soil.

Agricultural plant science

- basic anatomy of agricultural plants
- basic physiology of agricultural plants.

Assessment

Assessment Task One Advanced investigation

Collect local soil samples and investigate their properties using a scientific approach:

- mechanical analysis
- calculate the organic matter content
- determine pH of the soil.

Conduct some advanced botany experiments on selected agro-industry crops.

Assessment criteria

Assessment task one will be assessed on the extent to which students can:

- demonstrate comprehensive knowledge and understanding of soil properties
- determine the fertility of soil
- demonstrate knowledge and skills in conducting, making recommendations and conclusive statements using simple experiment techniques. 60 marks

Assessment Task Two - Written assignment

- Select a specific agro-industry and state its economic benefits to Papua New Guinea and show how it can be sustained.
- Discuss the negative effects a selected agro-industry has on the environment and communities.
- Discuss effects of the world economy on Papua New Guinea agriculture and give examples of how these effects can be managed to reduce their impact.

Assessment criteria

Assessment task two will be assessed on the extent to which students can:

- identify ways agricultural industries can contribute towards sustainability
- explain the effects of agricultural industries on the environment and communities and illustrate with recent examples
- analyse the effects of the world economy on Papua New Guinea agriculture and provide suggestions for managing these effects.

40 marks

Total: 100 marks

10.2 Agriculture production systems in Papua New Guinea 2

50 periods

This is a core unit and must be done in term three and four, Grade 10. It is an extension of the work done in Grade 9 core unit 2. It focuses on the big picture of agriculture in Papua New Guinea and shows how agriculture is composed of a series of interrelated and interdependent systems. The unit includes a study of various elements associated with agriculture: plants, animals, soils, insects, diseases, production, and environmental and economic systems.

From a big picture view, students will select a single system, discuss it in detail and show how it interrelates with the larger picture. Students' achievement of the learning outcomes will be through an assignment and a test.

Learning outcomes

Students can:

10.2.1. demonstrate an understanding of agricultural systems
10.2.2. explain the concept of interrelated systems
10.2.3. analyse a system in depth.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Systems - Agriculture bio systems

What is a system?

The following systems will be covered:

- plant cultivation
- animals husbandry
- soil management
- control of pests and diseases
- bio environmental systems.

Inter-dependence of systems relevant to agriculture

- environment and economy

- climate, soil, plants and animals
- pests, diseases and production
- profitability and markets
- appropriate technology and levels of production.

Sustainability

Factors to be considered in relation to sustainability:

- concept of environmental balance
- natural remedies versus artificial
- appropriate versus inappropriate technologies, plantings, and animal industries eg. Microbial pesticides, tissue culture, artificial insemination, genetic modification
- ethics eg. logging practices and use of chemicals.

Research on a single system

Select and analyse a single system and its place in the total system:

- principles of systems
- skills of research
- skills of analysis.

Assessment

Assessment Task One

Assignment: - Analyse a system in depth

- Select a crop and discuss its interdependence with other physical and biological factors.
- Select an animal and discuss its interrelatedness with physical and biological factors.
- Analyse several systems and discuss their sustainability.
- Communicate information clearly and succinctly.

Assessment criteria

Assessment task one will be assessed on the extent to which students can:

- use a variety of resources comprehensively to discuss a crop and its interdependence with other physical and biological factors
- demonstrate knowledge of the principles of the agricultural animal selected and discuss its interrelatedness with physical and biological factors
- analyse several systems and discuss their sustainability
- communicate information clearly and succinctly.

40 marks

Assessment Task Two - Tests

- show evidence of understanding of systems
- relate the single system to the big picture of agriculture
- identify the underlying principles of the systems.

Assessment criteria

Assessment task two will be assessed on the extent to which students can:

- demonstrate an understanding of a range of agricultural systems
- apply a single system as an example relating to the big picture of agriculture
- demonstrate an understanding of the principles of agricultural systems
- logically analyse a system
- communicate information clearly and succinctly.

60 marks

Total: 100 marks

Option 10.3 Pests and diseases project 50 periods

This unit looks at common pests and diseases that attack crops and livestock. The unit covers the need to research and plan a project with consideration for such aspects as causal organisms, reasons for controlling pests and diseases, classifications according to damage done, descriptions of damages caused by pests and diseases, feeding methods of pests and diseases, life cycles of pests and diseases, appropriate controlling methods of pests and diseases and some preventive measures. Students are made aware of problems associated with different physical, cultural and natural methods of managing and controlling pests and diseases. As part of this unit, each student will select a pest or disease organism, study it in detail and carry out control measures on the selected crops or animals.

Students' achievement of the learning outcomes will be assessed through a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

10.3.1. identify, analyse and describe the impact of the chosen pest or disease for the local and/or national economy
10.3.2. plan and conduct pest or disease control measures on selected crops or animals
10.3.3. evaluate the pest or disease management project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project – Pest or disease management

- research various pests and diseases which harm animals or crops and choose one for detailed study
- identify methods used to reduce growth and reproduction of the chosen pest or disease:
  - use more than one source of information
  - compare options
  - make a choice and reasons for the choice
  - consider sustainability of a chosen method.
- identify methods of controlling pests and diseases.

Principles of planning

Investigate the stages of planning a project on controlling a chosen pest or disease with emphasis on:

- physical issues- control site and climate
- financial issues- costs of management
- availability of resources
- time-lines. Can the project be completed in the available time-frame?

Principles of record keeping

- identify appropriate forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entry of pest management activities
  - logging of reduction of pests or diseases
  - recording of conditions of pest or disease growth
  - visual records (photos, sketches, diagrams and graphs)
  - regular sampling of the stages of reductions of pests and diseases.
- give evidence of reflective practice in record keeping.

Project implementation

Techniques of selected pest or disease management. Select and apply pest or disease management strategies.

Evaluate the project

- Were the goals met?
- Has the pest of disease been eradicated?
- What did I learn?

Assessment

Assessment Task - Project

Students must use the defined process to control a chosen pest or disease and produce a folio showing all the steps undertaken in the project. In the folio students will provide evidence of:

- undertaking research using more than one information source
- making a selection from the options considered and give reasons for the selection of pest or disease
- showing evidence of pest or disease management techniques used
- following logical processes in developing their pest or disease management project
- reflecting on what they learnt from the project
- communicating clearly and succinctly with their peers.

The folio might include:

- rough notes or sketches
- checklists
- plans
- progressive records of the project
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos
- reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of a pest or disease
- choose an appropriate pest or disease in order to minimize its spread
- safely use a range of agricultural tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems
- show evidence of control of pest or disease
- review the processes and make suggestions for future improvements if applicable
- demonstrate the ability to identify and solve problems
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 10.4 Wildlife farming project 50 periods

This unit looks at factors involved in developing and farming or harnessing economic wildlife species including honeybees, butterflies, tarantula spiders, crocodiles and others for generating income. The unit covers the need to research and plan a project with consideration for such aspects as species selection, box construction, field management, harvesting procedures, packaging, marketing and selling of the products and evaluation of the project. Students should be made aware of problems associated with farming a wildlife species and different physical, cultural and natural methods of managing and controlling these problems. As part of this unit, students will select and farm an economic wildlife species. All three strands are covered.

Students' achievement of the learning outcomes will be assessed through a folio which will include evidence of all stages of the project

Learning outcomes

Students can:

10.4.1. use a range of tools, skills and techniques
10.4.2 investigate, design and undertake a wildlife project that is ecologically suitable using appropriate codes and practices
10.4.3. evaluate the success of the wildlife farming project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project - Wildlife farming

Research topic

Research various wildlife species and choose one to farm. Identify the conditions and production techniques relating to the chosen wildlife species:

- use more than one source of information
- compare options
- make a choice and reasons for the choice of an wildlife species
- consider sustainability.

Principles of planning

Plan the stages of a wildlife farming project with emphasis on:

- physical issues- physical location, climate conducive for wildlife farming.
- financial issues- costs of production and profitability
- marketing issues- supply, demand, transport, wholesale and retail.

Principles of record keeping

- identify appropriate forms of record keeping for wildlife farming
- demonstrate the skills of continuous record keeping such as:
  - daily entry of the wildlife farming activities
  - regular logging of the stages of wildlife species growth
  - recording of conditions that affect the growth of wildlife species
  - visual records of insect farm (photos, sketches, diagrams or video clips).
- give evidence of reflective practice in record keeping.

Stages of project development for wildlife

Establishment of sites:

- select wildlife farming site
- identify caging structures
- identify equipment needed for successful wildlife farming.

Selection of economic wildlife species.

Wildlife farming including butterflies, honeybees, tarantula spiders and crocodiles:

- make the shelter boxes to house the wildlife selected
- get rid of the organisms that are harmful to the selected wildlife species
- identify and establish plants or other live organisms for wildlife to feed on
- farm the wildlife species
- conduct proper wildlife management practices.

Production techniques:

- place the boxes or make the shelter appropriately in designated sites
- place the wildlife in the boxes or shelter provided
- manage
  - water sources

- food sources for the wildlife
- diseases and pests that might harm the wildlife.

Harvesting and marketing

Harvesting and marketing techniques:

- maturity indices and harvesting
- packaging and marketing.

Assessment

Assessment Task - Project

Students must use the defined process to farm chosen wildlife species and produce a folio showing all the steps undertaken in the project

In the folio students will provide evidence of:

- researching using more than one information source
- making a selection from the options considered and give reasons for that selection of wildlife species
- showing evidence of pest or disease management techniques used in the wildlife farming
- following logical processes in developing their wildlife species management project
- reflecting on what they learnt from the project.

The folio might include:

- rough notes or sketches
- checklists
- plans
- progressive records of the wildlife project.
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos or video clips
- reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of wildlife species
- choose an appropriate wildlife species for maximum cash benefit
- safely use a range of agricultural tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems
- show evidence of complete control of pest or disease in the wildlife farm project
- review the processes make suggestions for future improvements if applicable
- demonstrate the ability to identify and solve problems
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 10.5 Floriculture project 50 periods

This unit looks at developing and producing flowers and ornamentals. Basic principles of flower growing as well as the cultural practices involved in production are given emphasis. The unit covers the need to research, plan and undertake a project with consideration for such aspects as soil quality, nursery techniques, field crop management, packaging, marketing and selling of the products, and evaluation of the project. Students should be made aware of problems associated with producing flowers and different physical, cultural and natural methods of managing and controlling these problems. As part of this unit, students select and grow flowers. All three strands are covered.

Students' achievement of the learning outcomes will be assessed through a folio which will include evidence of all stages of the project**.**

Learning outcomes

Students can:

10.5.1. use a range of tools, skills and techniques to produce flowers and ornamentals
10.5.2. investigate, design and implement flower production
10.5.3. evaluate the success of the project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project – Produce flowers and ornamentals

Research topic

Research various flowers and ornamentals and choose appropriate ones. Identify the conditions and production techniques relating to the chosen flowers or ornamentals.

- use more than one source of information
- compare options
- make a choice and reasons for the choice
- consider sustainability.

Principles of planning

Plan the project with emphasis on:

- physical issues- soils, climate
- financial issues- costs of production, profitability
- marketing issues- supply, demand, transport, wholesale, retail.

Principles of record keeping

- identify appropriate forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entry of the project activities
  - logging of growth plants
  - recording of conditions of soil and weather affecting this project
  - visual records (sketches, diagrams, plans, photos or video clips)
  - regular sampling of the stages of growth of flowers and ornamentals.
- give evidence of reflective practice in record keeping.

Stages of nursery development

Establishment of nursery or greenhouse:

- select site
- identify appropriate structures
- identify nursery equipment
- nursery soils- soil mixtures and composts
- soil preparation.

Nursery activities:

- establish nursery
- prepare soil and sterilise soil
- sow seeds and or raise cuttings
- hardening and transplanting seedlings
- conduct proper nursery management practices.

Production and implementation techniques:

- soil preparation
- transplanting
- management including:
  - water
  - nutrients
  - diseases and pests.

Harvesting and marketing

Harvesting and marketing techniques:

- maturity indices and harvesting
- washing and packaging
- marketing skills and techniques.

Assessment

Assessment Task – Project

Students must use the defined process to grow flowers and ornamentals and produce a folio showing all the steps undertaken in the project

In the folio students will provide evidence of:

- undertaking research using more than one information source to justify why the particular flowers were selected
- making a selection from the options considered and give reasons for the selection of flowers
- evidence of management techniques used in the flowers project
- following logical processes in developing their flowers project
- reflecting on what has been learnt from the project.

The folio might include:

- rough notes or sketches
- checklists
- plans
- progressive records of the project.
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos or video clips
- reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of flowers or ornamentals
- choose appropriate flowering plants and ornamentals to maximum cash benefit
- safely use a range of agricultural tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems
- demonstrate the ability to identify and solve problems
- review the processes and make suggestions for future improvements if applicable
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 10.6 Agronomy Project 50 periods

This unit looks at factors involved in developing and producing **traditional staples, vegetables, field crops, spices and perennial export crops**. Basic practical principles and skills of planning, establishing and producing and marketing as well as the cultural management practices and the economic aspects involved in the production are emphasised. The unit looks at the main crops in each of the above categories which are widely grown in Papua New Guinea. Emphasis on cultural management is covered in relation to land preparation, nursery techniques, field planting, staking, weeding, pest and disease control, harvesting, processing, packaging and selling of these crops. Students should be made aware of important field management problems and the physical, cultural and natural control methods to address these problems. The unit covers the need to research, plan and evaluate the outputs and outcomes of the agronomy project. As part of this unit, each student selects and grows a crop. All three strands are covered.

Students' achievement of the learning outcomes will be assessed through a folio which will include evidence of all stages of the project**.**

Learning outcomes

Students can:

10.6.1. use a range of tools, skills and techniques to grow the chosen crop
10.6.2. investigate, design and implement a project to grow a selected crop
10.6.3. evaluate the success of the project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project – Produce an agronomy crop

Research topic

Research various crops and choose one to grow. Identify the conditions required and production techniques relating to the chosen crop:

- use more than one source of information

- compare options
- make a choice and reasons for the choice
- consider sustainability.

Principles of planning

Plan the project with emphasis on:
- physical issues- soils and climate.
- financial issues- costs of production and profitability
- marketing issues- supply, demand, transport, wholesale and retail.

Principles of record keeping

- identify appropriate forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entry of the activities on the crops
  - logging of growth of crops
  - recording of conditions such soil, water, pests, diseases, weeds,
  - visual records (photos, video clips)
  - regular sampling of the stages of growth of a selected crop.
- give evidence of reflective practice in record keeping.

Stages of crop development

Establishment of nursery if appropriate and techniques required:

- select nursery site
- nursery structures
- identify nursery equipment
- nursery soils- soil mixtures and composts
- soil preparation
- seed sowing
- conduct proper nursery management practices including:
  - water management
  - nutrients
  - diseases and pests
  - record keeping.
- hardening and transplanting seedlings.

Direct planting

- select and mark site
- prepare site by weeding and preparing soil
- direct seed sowing, or transplant of seedlings
- manage:
  - water

- nutrients
- diseases and pests
- record keeping.

Harvesting and marketing

Harvesting and marketing techniques:

- maturity indices and harvesting
- washing and packaging
- marketing.

Assessment

Assessment Task

Project

Students must use the defined agronomic process to grow crops and produce a folio showing all the steps undertaken in the project.

In the folio students will provide evidence of:

- researching using more than one information source to justify why the particular agronomy crops were chosen
- effective planning of the layout of the field and crop planting sites
- identifying the principles relevant to the growing of the agronomy crops chosen
- identifying and managing the agronomic practices and techniques for the chosen crops
- following logical processes in developing their agronomy project
- researching and identifying a market
- reflect on what they learnt from the project.

The folio might include:

- rough notes or sketches
- checklists
- plans
- progressive records
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos or video clips
- brief reports.

Assessment criteria

The assessment task one will be assessed on the extent to which students can:

- research using a range of sources when making selection of crops
- choose an appropriate agronomy crop to maximum cash benefit
- safely use a range of agricultural tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems
- review the processes and make suggestions for future improvements
- demonstrate the ability to identify and solve problems
- communicate ideas and information in a variety of ways.

Total: 100 marks

Option 10.7 School developed unit 50 periods

School developed agriculture units are based on student interest and resources available in the local area. Schools develop a unit relevant to their community and students using the project approach, for example: Palm Oil Project 2, Coffee Production 2, Piggeries Project 2, Poultry Production 2, and Rice Project 2. The school developed unit encourages students to select, use and evaluate a range of agricultural skills and equipment to be used in the agricultural enterprise.

All key concepts of sustainability, agricultural technology and agricultural enterprise must be covered in the school developed unit.

Students' achievement of the learning outcomes will be assessed through assessment of the process and product and a folio which will include evidence of all stages of the project.

Learning outcomes

Students can:

10.7.1. use a range of tools, skills and techniques to undertake the project
10.7.2. investigate, design and implement a project that is ecologically suitable using appropriate codes and practices
10.7.3. evaluate the success of their project.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Student project

- research agricultural activities relevant to the local area and choose one
- identify the conditions and production techniques relating to the chosen activity
- consider:
  - what agriculture activity to undertake
  - purpose of undertaking the chosen activity
  - timeframes required
  - compare options
- selecting the agriculture activity/enterprise:

  - establish timeframe
  - identify products that will grow in the timeframe
- make a choice and give reasons for the choice
- sustainability. Can the project be sustained?

Project planning

Plan the stages of the project with emphasis on:

- physical planning
  - resources needed and when
  - type of equipment, materials
  - how the project will be monitored.
- financial planning to meet the above requirements
  - how the budget will be kept
  - principles and skills of identifying supply and demand.
- setting goals and timelines.

Record keeping
- identify various forms of record keeping
- demonstrate the skills of continuous record keeping such as:
  - daily entry
  - logging of growth
  - recording of conditions
  - visual records (photos, video clips,)
  - regular sampling of the stages of growth.
- give evidence of reflective practice in record keeping.

Project implementation

Establishment of project and techniques required to undertake the project:

- identify site for project
- structures required such as a fence, pen, cage
- identify equipment needed
- identify material needed
- identify feeding schedules
- product packaging
- general management practices.

Practical activities related to the selected project:

- establishment of any required structure
- select and acquire correct species suitable for the local area
- raise or grow the selected crop or animal
- manage the project including:

  - water quality or availability
  - nutritional level
  - diseases and pests
  - record keeping.
- harvest the products.

Evaluate the project

- Were the goals met?
- Has the value of the product increased?
- Can the product be marketed
- What did I learn?

Assessment

Assessment Task

Project

Students must use the defined process to complete the chosen project and produce a folio showing all the steps undertaken in the project.

The folio might include:

- rough notes or sketches
- checklists
- plans
- progressive records of the project
- work samples with comments written by the teacher
- labelled sketches and diagrams or photos
- brief reports.

Assessment criteria

The assessment task will be assessed on the extent to which students can:

- research using a range of sources when making selection of agricultural product
- choose an appropriate product to produce
- safely use a range of tools, skills and techniques
- apply knowledge and understanding of agricultural processes and systems
- demonstrate the ability to identify and solve problems
- produce products appropriate to the available resources
- review the processes and make suggestions for future improvements if applicable
- communicate ideas and information in a variety of ways.

Total: 100 marks

Assessment, examinations and certification

Assessment and reporting practices described here are detailed further in the National Assessment and Reporting Policy for Papua New Guinea (2003) and in other support materials produced by the Department of Education.

Assessment

The main purpose of assessment is to improve student learning.

Assessment needs to be **for** learning as well as **of** learning. It is used to evaluate and improve teaching and learning, report achievement and provide feedback to students on their progress.

Assessment measures students' achievement of learning outcomes as described in the syllabus. It is the ongoing process of identifying, gathering and interpreting information about students' achievement of the learning outcomes.

For teaching and learning to be outcomes-based, teachers need to plan their teaching and assess learner performance in relation to outcomes using criteria derived from those outcomes.

Assessing in an outcomes-based way involves focusing less on whether a learner has "passed" or "failed" and more on what outcomes a learner has achieved and in which areas further support is required.

Assessment in Agriculture

A student's achievement in Agriculture at the end of Grade 10 will be assessed against the broad learning outcomes. Assessment of student progress towards achieving these broad outcomes is cumulative throughout Grade 9 and 10 using specific outcomes for each unit. The matrix on page 18 and 19 of the syllabus shows how the unit outcomes are linked to the broad learning outcomes.

During the course of each unit students must complete the tasks specified for the unit. Teachers will expand each task and provide clear guidelines to students as to how the task will be completed and how the criteria will be applied.

The assessment tasks and criteria in each unit ensure that there is a common focus for internal assessment in the subject across schools while allowing for flexibility in the design of tasks. A variety of tasks are specified to give students the opportunity to demonstrate all the broad

learning outcomes in different ways and to improve the validity and reliability of the assessment.

It is important that teachers plan the teaching and learning sequence so that there is a balanced spread of assessment during the unit. Some tasks, such as investigations or case studies can be designed so that they are completed over a period of time rather than at the end of the unit. Other tasks can be done once the relevant section of the unit has been covered.

Assessment for the School Certificate

A student's overall achievement in Agriculture will be both internally and externally assessed. The mark awarded to each student for the School Certificate will be a combination of the internal assessment mark provided by the school and the examination mark.

Internal assessment

Internal assessment provides a measure of a student's achievement based on a wider range of syllabus content and outcomes than may be covered by the external examination alone.

For Agriculture, the internal assessment marks will provide a summation of each student's achievements in Grades 9 and 10. The assessment tasks used to determine the internal assessment mark must comply with the types of tasks and assessment criteria specified in each of the units.

All schools must meet the requirements for internal assessment as specified in the Grade 10 Assessment, Examination and Certification Handbook.

External examination

The external examination provides a measure of student achievement of those aspects of the broad learning outcomes that can be reliably measured in an examination setting. Questions for the external examination in Agriculture will be developed using the outcomes, knowledge and skills in the core units.

Recording

All schools must meet the requirements for maintaining and submitting student records as specified in the Grade 10 Assessment, Examination and Certification Handbook. students' learning progress and

achievement of the outcomes. Reporting of students' achievements must be fair and accurate.

Certification

Candidates will be awarded a School Certificate only if they meet all requirements for internal and external assessment. Eligibility rules for the award of the School certificate are specified in Grade 10 Assessment, Examination and Certification Handbook.