

WASSCE / WAEC FORESTRY SYLLABUS

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1. **PREAMBLE**

The Senior High School Forestry syllabus has been structured to assess candidates' knowledge of forestry and forest conservation. It will also assess candidates' knowledge and skills in forestry practices that will form the basis for sound tertiary education in forestry and also make them employable in the forestry industry and related disciplines.

2. **AIMS OF THE SYLLABUS**

The syllabus will seek, among others, to assess candidates:

- (1) Appreciation of the importance of forests to life,
- (2) Knowledge and skills in current forestry practices,
- (3) Understanding of the effects of population growth on forests,
- (4) Understanding of the causes and effects of forest degradation,
- (5) Understanding of the regulations governing the use of the forests and forest resources,
- (6) Knowledge of the functions of forestry sector institutions,
- (7) Basic skills in establishing and managing forest plantations,
- (8) Ability to contribute to the conservation and sustainable use of forests.

3. **REQUIREMENTS**

- (1) Schools offering Forestry are expected to keep demonstration plots where a variety of both indigenous and exotic forest trees are grown and maintained to develop their skills in the management of forest stands.
- (2) It is recommended that candidates visit forest reserves, national parks, zoos and forest plantations, forestry institutions and industries for experiential learning.
- (3) It is recommended that candidates keep practical notebooks and specimen albums. These should contain records of activities based on laboratory, nursery and field observations to develop their documentation skills.

4. **EXAMINATION SCHEME**

There will be three papers: Papers 1, 2 and 3.
Papers 1 and 2 will be combined in a 3-hour composite paper.

PAPER 1: Will be an objective test consisting of 50 multiple-choice questions, all of which should be answered within 1 hour for 50 marks

- PAPER 2: Will consist of six essay type questions. Candidates will be required to answer four questions within 2 hours for 80 marks.
- PAPER 3: Will be a practical paper for school candidates or an alternative to the practical paper for private candidates.
It will consist of four questions all of which should be answered within 2-hours for 60 marks.

SCOPE OF CONTENTS

Questions will be set on the topics listed in the column headed 'content'. The notes therein are intended to indicate the scope of the questions but are not to be considered as an exhaustive list of limitations and illustrations.

CONTENTS	NOTES
<p><u>SECTION A</u></p> <p><u>INTRODUCTION TO FORESTRY</u></p> <p>1. Basic concepts of Forest and Forestry.</p> <p>2. Introduction to Forest Ecology.</p> <p>(a) Concept of forest Ecology.</p> <p>(b) Forest Ecosystem</p>	<p>Candidates will be examined on the meaning of forest and forestry. Knowledge of the differences between Forestry and Agriculture in terms of land occupancy, time frame; risk etc. and the business aspects of forestry will be assessed.</p> <p>The functions of the forest; types of plants in the forest (trees, shrubs, herbs, climbers, special plants); the local and botanical names of timber trees will also be assessed.</p> <p>Candidates' ability to describe plant habitats i.e. water -logged (aquatic), dry land, valley/slope, hill tops (terrestrial) and on plants (arboreal) and to name the types of plants found in the various habitats will be assessed.</p> <p>Types of animals found in the forest; (birds, insects, mammals, reptiles, amphibians, snails) and characteristics of the habitats of the animals are required.</p> <p>Knowledge of the characteristics of the Forest environment; its physical components; and the meaning of forest ecology is required.</p> <p>The meaning of ecosystem and examples/types of ecosystem in various habitats (aquatic, terrestrial, arboreal); the major components of the ecosystem and their functions are required.</p> <p>Understanding of food chains and food webs and the</p>

<p>(c) Ecosystem functions</p>	<p>types of producer – consumer relationships including symbiotic associations eg. rhizobium in the various habitats in the forest environment will be assessed. Differences between saprophytes and epiphytes are also required.</p> <p>Knowledge of ecosystem functions (Regulation, supporting, cultural) will be assessed. Effects of good and degraded ecosystems on health is also required.</p>
<p>3. Ecological Zones (a) Vegetation Zones</p>	<p>The characteristics of the major vegetation zones and vegetation types in West Africa will be assessed. Comparisons of the various zones in terms of differences in plant species will be required. The typical plants and animals and their characteristics and the various plant and animal associations in the zones will be assessed. The vegetation types are Wet-evergreen, Moist-evergreen, Moist semi-deciduous, Dry semi-deciduous, Mangroves and Savannah.</p>
<p>(b) Factors Affecting Distribution of Vegetation.</p>	<p>Factors affecting the distribution of vegetation namely; Climatic (rainfall and temperature), Edaphic (soil factors) and Biotic factors will be assessed.</p>
<p>(c) Forest Types (i) Comparison of Forest Types. (ii) Land use Practices.</p>	<p>The Distribution, Composition and Structure of Tropical High Forest (Tropical rain forest, tropical moist semi-deciduous forest), Savannah, Coastal Scrub and Grassland is required. Characteristics of virgin or primeval, secondary, natural and artificial forests are also required. Land use practices in the different vegetation zones will be assessed.</p>
<p>(d) Major Forest Types in Relation to Latitudes.</p>	<p>The characteristics of the following major forest types in relation to latitude i.e. Tropical, Temperate Coniferous and Arctic forest types is required.</p> <p>Understanding of the relationship between temperature and latitude in the determination of the forest types, and the knowledge of the characteristics and distribution of angiosperms and gymnosperms are required.</p>

<p>4. Introduction to Wildlife</p> <p>(a) Concept of Wildlife</p> <p>(a) Identification of Wildlife species</p> <p>(c) Importance of Wildlife</p> <p>(d) Endangered, Rare and Common Wildlife Species</p> <p>(e) Wildlife Reserves</p> <p>(f) Wildlife Management Practices</p>	<p>Understanding of the term wildlife and knowledge of wildlife resources in Ghana will be assessed.</p> <p>Knowledge of the common and scientific names of wildlife species is required.</p> <p>The importance of wildlife to the Socio-economy; Environment, Forestry, Tourism and Scientific research will be assessed.</p> <p>Examples of the wildlife species that are Endangered (e.g. Elephants), Rare (e.g. Porcupine) and Common (e.g. grasscutter); and the reasons why the wildlife species are in those states will be assessed.</p> <p>Types and examples of wildlife reserves in Ghana will be assessed. The types of wildlife reserves are as follows:</p> <ul style="list-style-type: none"> (i) National Parks e.g. Mole, Kakum, Bui. (ii) Game Production Reserves e.g. Shai Hills (iii) Wildlife Sanctuaries e.g. Buabeng-Fiema, Owabi (iv) Strict Nature Reserves e.g. Digya <p>The features and location of the various wildlife reserves is also required.</p> <p>Management practices associated with the various wildlife reserves and zoos; and protection of game reserves against poachers will be examined.</p>
<p>5. Plant parts and Tree Identification</p> <p>(a) Plant Parts and Functions</p>	<p>The morphological and anatomical features of plants and their functions will be assessed. Anatomy of the leaf, stem and roots; covering tissues such as xylem, phloem, cambium, epidermis, cortex and pith is required.</p>

<p>(b) Identification of Trees</p>	<p>Ability to identify trees using the observable features of tree parts such as leaves, bark, buttress and stem is required.</p> <p>Knowledge of local/trade names and scientific names and application of rubrics of scientific nomenclature are required.</p>
<p><u>SECTION B</u></p>	
<p><u>FOREST ESTATES</u></p>	
<p>1. Concept of Forest Estates</p>	<p>The processes for Reservation and Constitution of a forest estate; the role of a Reserve Settlement Commissioner; Internal and External Pillaring and Admitted Rights. Differences between Protected forest and Non-protected forest is required.</p>
<p>2. Management of Forest Estates</p>	<p>Systems of Management and Development of Public and Private Estates will be examined. Forest estate management problems such as Bushfires, Illegal farming, Illegal felling, Chain-sawing and Illegal mining and their solutions will be assessed.</p> <p>Understanding of bushfires as</p> <ul style="list-style-type: none"> (i) management problem, and (ii) management tool is required.
<p>3. Current State of the Forest</p>	<p>Knowledge of historical facts of Ghana's forest: area, composition of forest resources, and population growth showing the trend of forest depletion from the past to present; i.e. from the beginning of the century through independence to the current estimate of closed forest is required.</p>
<p>4. Protective Measures</p>	<p>Forest resources threatened by over-exploitation and measures introduced by the Forest Services Division to stop over-exploitation and protect the forest resources; including</p> <ul style="list-style-type: none"> - Ban on log exports, - Star rating of species, - Differential stumpage fees, - Participatory forestry, - Yield selection and approval, - Acquisition of permits and felling rights is required.

<p>5. Deforestation</p> <p>(a) Forms and Causes</p> <p>(b) Effects of deforestation</p> <p>(c) Control of Deforestation</p>	<p>Understanding of the term deforestation; the indicators or manifestations of deforestation in the environment and the causes of deforestation through human activity; bushfires, farming activities, felling of trees for various purposes, settlement and urbanization, etc. is required.</p> <p>The effects of deforestation on</p> <ul style="list-style-type: none"> (i) Soil fertility (ii) Animal habitat/population (iii) Economy (iv) Environment <p>are required.</p> <p>Control measures such as appropriate farm practices, education, control of indiscriminate tree felling, enforcement of forest laws and regulations, appropriate harvesting and milling equipment; and Intervention programmes such as education, rehabilitation, afforestation and reforestation are required.</p>
<p>6. Reforestation, Afforestation and Reafforestation.</p>	<p>The meaning of reforestation, afforestation and reafforestation and the differences between them are required.</p> <p>Understanding of silvicultural terminologies such as silvics, silviculture, soil seed bank, shade-demanding plants, light-demanding plants, plant succession and forest gaps is also required.</p>
<p>7. Natural Regeneration</p> <p>(a) Concept of natural regeneration</p> <p>(b) Factors Influencing the choice of natural regeneration</p> <p>(c) Succession in natural regeneration</p>	<p>Understanding of the concept of natural regeneration, soil seed bank, gaps (natural) is required.</p> <p>Factors leading to the choice of natural regeneration i.e. topography and slope, type of forest, level and extent of deforestation, occurrence of seed bearing (mother) trees will be assessed.</p> <p>The stages of Succession (primary, secondary and climatic climax) and examples of light and shade tolerant trees are required.</p>

<p>(d) Intervention methods during natural regeneration</p>	<p>When to use intervention methods such as line and spot planting to supplement natural regeneration potential of forest is required. Advantages of natural regeneration over artificial regeneration are also required.</p>
<p>(e) Other intervention measures (i) Agro-forestry</p>	<p>The meaning of the term agro-forestry; Knowledge and skills in carrying out agro-forestry practices such as Agro-silviculture, alley cropping, mulching, pruning etc. are required.</p> <p>Characteristics of plants suitable for agro-forestry; the benefits derived from practising agro-forestry such as providing mulch (green manure), pruning material for fodder, companion food, fire wood from the same piece of land area; and its role in plant nutrient recycling is required.</p> <p>Knowledge of Silvo-pastoral and Agro-silvo-pastoral practices is also required.</p>
<p>(ii) Taungya Practices</p>	<p>Understanding of the concept of Taungya, historical background, the factors/conditions that influence the choice of taungya in forest estate and the advantages and disadvantages of the practice are required.</p>
<p>8. Artificial Regeneration</p>	<p>Understanding of the concept of artificial regeneration (forest plantations) with regard to the use of indigenous species or exotic species in pure or mixed stands; and the advantages and disadvantages of the use of exotic species in plantation development are required.</p>
<p>9. Invasive Alien species</p>	<p>Knowledge of invasive alien plants e.g. Aquatic: <i>Eichlornia crassipes</i> (water hyacinth); <i>Salvinia molesta</i> (Kariba weed), <i>Pistia stratoites</i> (water lettuce), <i>Mimosa pigra</i> (large sensitive plant) Terrestrial: <i>Chromolaena odorata</i> (Acheampong weed), <i>Broussonetia papyrifera</i> (Pulp mulberry – York), <i>Leucaena leucocephala</i></p>

SECTION C

**PLANTATION
ESTABLISHMENT AND,
FOREST
MENSURATION**

1. Plantation Development

The purpose of plantation establishment and differences between plantation and natural forest is required.

(a) Factors influencing plantation development

Understanding of factors such as the following that influence plantation development will be assessed:

- (i) Deficit of wood for industrial and domestic use.
- (ii) Level of environmental degradation.
- (iii) Need to improve upon the stocking of existing tree species.
- (iv) Need for specific tree type for industrial purposes.

(b) Plantation Planning and Design

Ability to plan and design a plantation considering its objectives, site selection and preparation, species selection, cost etc. is required.

2. Nursery Establishment

The functions and importance of a nursery as a supply source of seedlings of high quality is required. Knowledge of types of nurseries (permanent and flying or temporary nurseries) is also required.

(a) Cultural Practices

Bed preparation and other cultural practices such as pricking out; stumping; stripling; hardening-off; transplanting; seed collection; storage; treatment and sowing; watering; weeding and shading will be assessed.

(b) Nursery Tools and Equipment

Knowledge of types of nursery tools and equipment such as pick-axe, shovel, rake, hoe, wheel barrow, cutlass, watering can and their uses will also be assessed.

(c) Nursery Pests and Diseases

Knowledge of nursery pests such as slugs/snails and termites; the nature of damage caused by the pests and their control is required.

Knowledge of nursery diseases, such as damping off

<p>(d) Costing Nursery Establishment</p>	<p>and rust, their symptoms and control is also required.</p> <p>Knowledge of various sources of cost in establishing a nursery grouped into:</p> <ul style="list-style-type: none"> (i) Direct costs: raw materials, labour and expenses for tools etc, and (ii) Indirect costs: cost of work-related materials e.g. stationery and other consumables; maintenance costs, rent of nursery plot, will be assessed. <p>Ways of controlling nursery cost and record keeping will also be assessed.</p>
<p>3. Planting and Tending</p> <ul style="list-style-type: none"> (a) Land Preparation (b) Seedling Planting (c) Tending Operations (d) Operational Costs 	<p>Site clearing and pegging at required spacing is required.</p> <p>Use of appropriate methods of planting seedlings is required.</p> <p>Tending operations and the importance of each tending operation is required. The operations required include Weeding (complete, spot and line), Beating up, Pruning and Thinning. The effects of improper tending such as poor height and diameter growth, early branching and poor wood quality will also be required.</p> <p>Knowledge of sources of operational costs (direct and indirect costs) and their significance in management is required. Knowledge of kinds of records to be kept on a plantation and the Importance of Record Keeping is also required.</p>
<p>4. Forest Mensuration</p> <ul style="list-style-type: none"> (a) Meaning, Importance and Purpose 	<p>Understanding of the term forest mensuration and its importance; and the purpose of mensuration in Forestry including the comparison of current and future states of the forest, determination of quantity of trees, costing and pricing, management, etc. are required.</p>

<p>(b) Measuring Instruments and Equipment</p> <p>(c) Enumeration of Growing Stock and Sampling Methods.</p> <p>(c) Surveys</p>	<p>Knowledge of and skills in the use of tools, instruments and equipment for forest mensuration are required. The tools, instruments and equipment include Haga altimeter, tape, clinometer, compass, measuring chain, ranging poles and arrows.</p> <p>Knowledge of the parameters measured and the units of measurement in the metric system is required. Ability to determine height, diameter, girth and volume of trees is also required.</p> <p>Kinds of enumeration (100%, 5%, 2%) of growing stock; sampling and sampling methods adopted in forest mensuration (selective, systematic and random sampling) is required.</p> <p>Understanding of survey, kinds of survey (stock survey, strip survey and land survey) and its significance will be assessed. Knowledge of and use of conventional keys/symbols in recording botanical names of trees is required.</p>
<p><u>SECTION D</u> <u>HARVESTING AND</u> <u>MARKETING OF</u> <u>FOREST RESOURCES</u></p>	
<p>1. Harvesting of Timber</p> <p>(a) Factors to consider/Pre-harvesting activities.</p> <p>(b) Procedures to follow</p> <p>(c) Log Markings</p> <p>(d) Harvesting,</p>	<p>Factors to consider before harvesting timber; and the pre-harvesting activities carried out will be assessed. These include stock survey, reconnaissance and field inspections, pre-felling inspection and selection of trees to fell.</p> <p>The procedures to follow in harvesting timber in natural Forests and Plantations is required. These include permit acquisition, yield approval (for natural forest); felling, extraction and measurement.</p> <p>Knowledge of how logs are marked and interpretation of log markings; namely, property mark, locality mark, compartment number, stock survey number, tree number, reserve code and log number will be assessed.</p>

<p>Extraction and Transportation Processes</p>	<p>The following processes will be assessed: Felling and cross-cutting, Hauling, Marking, Loading and Transportation.</p>
<p>(e) Harvesting Equipment and Safety Measures</p>	<p>Knowledge of the various equipment for harvesting timber including chain-saw, hand saw, axe and cutlass and their advantages and disadvantages is required. Safety measures taken when harvesting timber such as use of safety gear, directional felling, staff training will also be assessed.</p>
<p>2. Harvesting of Non-Timber Forest Products (NTFPs).</p>	<p>Examples of non-timber forest products including Marantaceae leaves, chewing sticks, plant medicines, canes, rafters, bush meat is required. Knowledge of methods of harvesting NTFPs. ie. Hunting (bushmeat), Gathering (Leaves, food, snails, medicine, mushroom), Trapping (birds, bushmeat) considering the safety and sustainability of each method is required.</p>
<p>1. Uses of Harvested Forest Products</p>	<p>Common uses of forest products e.g. shelter, furniture, household utilities, artefacts, food, and medicine is required.</p>
<p>4. Harvesting of Wildlife</p>	<p>Knowledge of wildlife harvesting techniques namely; hunting, trapping, baiting and gathering; and the sustainability of the harvesting techniques will be assessed. Knowledge of endangered, rare and common species and reasons for them being endangered, rare or common will be assessed</p>
<p>5. Harmful Wildlife Harvesting Practices.</p>	<p>Harmful wildlife harvesting practices such as use of chemicals, fire, gin-trap and measures to control them will be assessed. Measures aimed at reducing wildlife harvesting including training and education, sanctions and confiscation of harmful equipment, close and open hunting seasons, hunting permits and ban on night hunting required.</p>
<p>6. Marketing of Forest Products (a) Classification of forest products</p>	<p>Classification of forest products into direct and indirect benefits: (i) Direct benefits: Timber and Non-timber forest products.</p>

<p>(b) Contribution of forest products to national economy.</p> <p>(c) Demand for forest products.</p> <p>(i) Factors affecting demand for forest products.</p> <p>(ii) Types of forest products demanded by the local market and foreign market.</p> <p>(ii) Differences demand for products</p> <p>(iv) Socio-economic benefits and effects of demand for product</p>	<p>(ii) Indirect benefits: Non-tangible products is required.</p> <p>Contribution of forest products to income and employment generation will be assessed.</p> <p>Factors which affect demand for forest products, including</p> <ul style="list-style-type: none"> - Demand spectrum of selected forest products - Local and external markets for products - Role of forest-based industries - Current use is required. <p>Forest products demanded locally including bushmeat, pestles, wrappers, chewing stick, timber, mushroom, medicinal plants etc. and those demanded by foreign market including processed timber, medicinal plants, rattan, live animals, animal trophies etc. will be assessed.</p> <p>Reasons for differences in demand for products on both local and foreign markets will be assessed. These include</p> <ul style="list-style-type: none"> - differences in taste - differences in lifestyle - differences in the level of economics development - quality of produce - availability of produce <p>Socio-economic benefits and effects of demand for forest products such as increased revenue, employment opportunities and depletion of resources will also be assessed.</p>
<p>7. Marketing Agencies and their functions</p>	<p>The various agencies involved in the marketing of forest products and their functions is required. The agencies include the following: Wood products-GEPC, TIDD Other products like medicinal plants, wood carving, rattan productsetc.- GEPC and other private companies.</p>
<p>8. Forest Industries (a) Timber Industries and Timber Products.</p>	<p>Different types of forest industries e.g. sawmills, plywood mills, chipboard mills, their locations and sources of raw materials will be assessed.</p>

<p>(a) Career and Training Opportunities</p> <p>9. Establishing enterprises in forestry</p>	<p>The contribution of the forest industries to the economy with emphasis on timber processing, range of products; marketing, employment opportunities, and export earnings will be required.</p> <p>Processes involved in timber processing and the products obtained namely sawn boards; (2 x 4, 2 x 6, 1 x 8, 1 x 12 etc.) veneer and plywood will be required.</p> <p>Sawmilling equipment used in processing the timber into the products eg. bandmill, slice veneer equipment, rotary veneer equipment will also be assessed.</p> <p>Forestry training institutions in Ghana and job opportunities in Forestry and forestry-related careers such as carpentry and furniture, wood carving, wood marketing and export, wood</p> <p>Knowledge of the factors and resources for establishing forest enterprises is required. Factors - e.g. Identification of business opportunities in forestry, identification of a forestry product or service needed.</p> <p>Resources:- land, capital, materials and structures etc.</p> <p>Procedures for establishing enterprises in forestry</p>
<p><u>SECTION E</u></p> <p><u>FORESTRY SECTOR STRUCTURES</u></p> <p>1. Policy-making, Implementation, Monitoring and Evaluation.</p> <p>2. Training and Research</p> <p>1. Rights to Forest</p>	<p>Functions of the Ministry responsible for forestry (Ministry of Land, Forestry and Mines) and the structures and functions of the Forestry Commission (FC) will be assessed.</p> <p>Functions of the following implementing agencies will also be assessed:</p> <p>Forest Services Division (FSD), Wildlife Division (WD) and Timber Industry Development Division (TIDD).</p> <p>Roles of the following training and research institutions for improving the forest industry will be assessed : FORIG, FRNR, FFRT and WITC.</p>

Resources	
(a) Types of Rights	Existing rights governing the use of forest resources in Ghana will be assessed. These include Timber Utilization Contract (TUC), Timber Utilization Permit (TUP) and Salvage Permits for timber resources and Permits for non-timber forest products. Differences between the rights will also be assessed.
(a) Acquisition of Rights	Procedure for acquiring TUC, TUP and other permits is required.
(b) Violation of Rights	Activities that violate rights (illegal activities) such as illegal felling, poaching of wildlife, encroachment (illegal farming, illegal mining) is required.
4. Role of Stakeholders	Stakeholders of forest resources and the roles they play in sustaining the forest is required. Stakeholders include: (i) Government Sector Institutions - Forestry Commission (WD, FSD, TIDD) (ii) Traditional Authorities and Communities. (iii) Non-Governmental Organisations (iv) Forest-based industries.
5. Land Tenure Systems	Understanding of the terms; and ability to distinguish between alienation rights and also required.
(a) Types of Land Tenure	The major land tenure systems in Ghana: Communal, individual, leasehold etc; and the advantages and disadvantages of the systems will be assessed.
(b) Role of Stools, Skins and Central Government in Land Ownership	Role of stools and skins and central government in land ownership will be assessed.
(c) Land Registration	
(d) Impact of Land Tenure on Land use.	The importance and the procedure for land registration will be assessed.
2. Forest Policy and Law	Effects of land tenure on land use systems e.g. fragmentation, litigation etc. and ways to improve the land tenure system in Ghana are required.

SECTION F
INCOME GENERATION
VENTURES

- (1) Cultivation of Mushroom
 - (a) Importance and Uses of Mushroom
 - (b) Biology of mushroom
 - (i) Classification of fungi
 - (ii) Poisonous and Non-poisonous mushroom/
Commercial and Non-commercial mushroom
 - (iii) Commonly cultivated mushroom in West Africa
 - (iii) Nutrition of mushroom
 - (iv) Life cycle of mushroom
 - (vi) Methods of mushroom cultivation

Forest and Wildlife policy and its importance e.g. Management of forest estate, production of forest industries, manpower training and research, stakeholders interest will be assessed.
 Forest and Wildlife laws and their importance is required.

Importance of mushroom i.e. economic, nutritional, medicinal and agricultural uses of by-products will be assessed.

Classes of fungi and their characteristics with special emphasis on Basidiomycetes will be assessed.

Features of poisonous and non-poisonous mushrooms; commercial and non-commercial mushroom will be assessed.

Names of; and ability to identify mushrooms that are commonly-cultivated in West Africa are required

How mushroom obtains its nutrients or subsists on substrates/media will be assessed.

The life cycle of mushroom showing the reproduction and production cycles in mushroom is required.

<p>(vii) Production practices</p>	<p>The different methods used for cultivating mushroom indicating in particular the stages/ steps that are followed in each of the following methods:</p> <ul style="list-style-type: none"> - local/pit method - high bed method - low bed method - indoor/commercial/plastic bag method will be assessed.
<p>(viii) Harvesting of mushroom</p>	<p>Practices involved in the production of mushroom, especially by the bag method namely;</p> <ul style="list-style-type: none"> - composting the substrate - bagging the substrate - sterilizing the bagged compost - inoculation - cropping is required.
<p>(ix) Post-harvest handling</p>	<p>Ability to detect signs of maturity, techniques and precautions used when harvesting, frequency of harvest and yield of the different types of mushroom, will be assessed.</p>
<p>2. Beekeeping</p>	
<p>(a) Importance of beekeeping</p>	<p>Skills in the processing and packaging of mushroom and methods of preservation such as roasting, freezing and canning are required.</p>
<p>(b) Apiary establishment</p>	<p>Importance of beekeeping will be assessed.</p>
<p>(c) Members of honey bee colony and their roles</p>	<p>Skills in the establishment of an apiary i.e. siting beehives, baiting and capturing will be assessed.</p>
<p>(d) Management of an apiary-routine practices and precautions</p>	<p>Characteristics and roles of the members of honey bee colony namely; queens, drones and workers is required</p>
<p>(b) Maturity of colony, harvesting and processing.</p>	<p>Routine management practices and precautions to avoid harm to farmers will be assessed. Ability to control pests and diseases of honey bees will also be assessed</p>

<p>(f) Marketing of honey and other products</p> <p>1. Introduction to Wildlife and Plant Identification.</p> <p>2. Tools, Equipment and Machinery</p> <p>3. Nursey practices</p> <p>2. Plantation Establishment: Land preparation</p> <p>5. Forest Mensuration</p>	<p>Detection signs of maturity, methods of harvesting and processing of honey, wax and other products will be assessed</p> <p>Strategies for marketing honey and other products is required.</p> <p>Methods and skills in identification and classification of plants and animals i.e. <u>Wildlife:</u> <u>Fauna</u> Using observation skills to recognize wildlife through footprints, tracks, droppings, size, form, external features and prominent organs.</p> <p><u>Plants:</u> Using observation skills to recognize plant parts: stem form, crown shape, size, texture and arrangement of vegetative parts, colour of flower, fruit, etc. Application of conventional keys. Knowledge of habitats of wildlife is required. The anatomy of leaves, stems and roots is also required.</p> <p>Ability to identify, use and maintain tools, equipment and machinery used in forestry and wildlife management is required. Advantages and disadvantages of using the tools are required.</p> <p>Soil treatment methods, seed collection and storage, seed testing and treatment; methods of sowing and planting; and practices such as pricking-out, hardening-off and transplanting; Nursery pests and diseases and their control are required. Ability to design a calendar for tree nursery development is also required.</p> <p>Plantation design and planning, surveying and site clearing, pegging, methods of planting and cultural practices such as Thinning, Pruning, Weeding, Beating up and Record Keeping are required.</p>
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<p>6. Harvesting of Forest Resources</p> <p>(1) Methods of Harvesting Timber</p> <p>(2) Methods of Harvesting Non-timber Forest Products (Plants and Animals)</p>	<p>Methods and ability to determine height, diameter, girth and volume of trees and NTFPs, and angles of slopes are required.</p> <p>Knowledge of units of measurement, and use of conventional symbols are also required.</p> <p>Felling operations and safety measures, procedure for harvesting will be assessed.</p> <p>Log markings: property mark, locality marks, compartment number, stock survey number, tree number, reserve code, log number etc. is required.</p>
<p>7. Processing of Forest Resources</p> <p>(1) Timber</p> <p>(2) Non-Timber Forest Products</p>	<p>Existing harvesting practices; hunting wildlife (bushmeat), collection (snails, mushroom) Gathering (leaves, food, medicine) Trapping (wildlife); and harmful harvesting practices is required.</p> <p>Ability to identify types of processed forest products e.g. samples of veneer, plywood, particle board, artefacts (wood carvings) etc. is required.</p> <p>Knowledge and understanding of methods of processing timber into the aforementioned products are also required.</p>
<p>8. Income Generating Ventures</p> <p>(1) Mushroom Cultivation</p> <p>(2) Beekeeping</p>	<p>Ability to identify products such as rattan, bamboo, mushrooms, snails, bushmeat, medicinal plants etc. and knowledge of their processing and preservation methods and their uses will be assessed.</p> <p>Ability to identify kinds of mushroom, and knowledge of the uses, methods of cultivation, production, harvesting, processing and preservation practices are required.</p>

	<p>Ability to identify various members of bee colony and knowledge of their roles and uses of products are required.</p> <p>Knowledge and understanding of management, harvesting, processing and marketing activities are also required.</p>
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