

AGRICULTURAL SCIENCE

COMPREHENSIVE TEACHING NOTES

Competence-Based Curriculum (CBC) | Form 1 | Ordinary Level

Topics Covered in This Volume:

- 1.1 Agriculture in Zambia
- 1.2 Soil Science
- 1.3 Climate-Smart Agriculture
- 1.4 Farm Structures and Machinery
- 1.5 Crop Production | 1.6 Livestock Production

Secondary Education Ordinary Level | Form 1
Zambia Curriculum Framework 2023

Ministry of Education

Republic of Zambia

CONTENTS OVERVIEW

Topic 1.1 Agriculture in Zambia — Importance | Agricultural Activities | Factors Affecting Development | Types of Farmers

Topic 1.2 Soil Science — Composition | Properties | Fertility | Soil Water

Topic 1.3 Climate-Smart Agriculture — CSA | Drones | Climate Change

Topic 1.4 Farm Structures and Machinery — Garden Tools and Equipment

Topic 1.5 Crop Production — Vegetable Production

Topic 1.6 Livestock Production — Importance of Livestock | Nutrition and Feed Formulation

Appendix — Key Competences | Assessment Summary | Curriculum Alignment | Recommended Resources

HOW TO USE THESE TEACHING NOTES

These teaching notes are designed specifically for the Zambia Competence-Based Curriculum (CBC) Agricultural Science syllabus at Ordinary Level, Form 1. They are structured around the CBC's Three-Circle Pedagogical Model, which integrates classroom/laboratory learning, supervised agricultural experience, and study tours.

Each lesson section follows the recommended CBC teaching template:

- Specific Competence and Learning Outcomes — clearly stated at the start of each lesson
- Starter Activity — to activate prior knowledge and engage learners
- Main Learning Activities — learner-centred, inquiry-based tasks with teacher facilitation notes
- Real-Life Link — connecting content to Zambian agricultural realities
- Cross-Cutting Issues — embedding entrepreneurship, sustainability, ICT, and other cross-cutting themes
- Formative Assessment Check — at least one quick assessment per lesson
- Differentiation Strategies — support for struggling learners and extension for fast finishers
- Reflection Prompt — closing the lesson with metacognitive questions

Teachers are encouraged to adapt activities to their local context, available resources, and learner needs. The school garden should be used wherever possible to provide hands-on supervised agricultural experience. Gender-responsive practice — calling on all learners equally, using examples relevant to both boys and girls — is embedded throughout.

TOPIC 1.1: AGRICULTURE IN ZAMBIA

Agriculture is the backbone of Zambia's economy and the primary source of livelihood for the majority of Zambians. This topic introduces learners to the concept, classification, importance, and agricultural activities in Zambia. It also examines the factors that influence agricultural development and the various types of farmers in the country. Understanding these foundations is essential before learners engage with more advanced agricultural science concepts.

1.1.1.1 Importance of Agriculture

Topic: 1.1 Agriculture in Zambia

SPECIFIC COMPETENCE	Demonstrate understanding of the importance of Agriculture in Zambia
LEARNING OUTCOMES	Learners will be able to: classify Agriculture as applied science or technology; describe how agriculture supports food provision, food security, raw materials, employment, income generation, and foreign exchange; evaluate the impact of underdevelopment of agriculture in Zambia; and generate ideas to improve agriculture in Zambia.
RESOURCES	Textbook, photographs of Zambian farms, newspaper clippings about agriculture, local food products, map of Zambia, notebooks.

STARTER ACTIVITY (5–10 minutes)

Ask learners: 'Can you name five things you ate yesterday?' List answers on the board. Ask: 'Which of these came from agriculture?' This activates prior knowledge and links agriculture to daily life.

Show a simple image or drawing of a farm and a laboratory. Ask learners: 'Is farming a science or just physical work? Give reasons.' This introduces the idea of agriculture as applied science.

MAIN LEARNING ACTIVITIES

Activity 1: Classifying Agriculture

- Explain that agriculture can be understood as an applied science (using scientific principles to grow crops and rear animals) or as a technology (using tools, equipment, and techniques to improve production).
- Learners work in pairs to write two definitions: one for agriculture as a science and one as a technology. Share definitions with the class.
- Class discussion: What distinguishes scientific farming from traditional farming? Introduce key terms: agronomy, horticulture, animal husbandry, aquaculture.

Teacher circulates to check understanding and address misconceptions. Encourage learners to use examples from their own communities.

Activity 2: Investigating the Value of Agriculture

- In groups of 4–5, learners investigate and record the value of agriculture under these headings: Food Provision, Food Security, Raw Materials, Employment, Income Generation, Foreign Exchange.
- Each group presents one heading. Teacher facilitates by asking probing questions: 'What happens to food security if the rains fail?', 'How does maize generate foreign exchange for Zambia?'
- Learners compile a group chart or table summarising the importance of agriculture. Charts are displayed in class.

Encourage use of local examples (e.g. FISP, maize production, tobacco exports). Link to entrepreneurship — farmers as business people.

Activity 3: Evaluating the Impact of Agricultural Underdevelopment

- Teacher explains the concept of underdevelopment in agriculture: low mechanisation, reliance on rainfall, poor storage, limited markets.
- Learners analyse case scenarios (e.g., a farmer who loses crops due to pests and has no market access). Discuss: What are the consequences for the family? For the community? For the country?
- Class discussion: What innovations could improve agriculture in Zambia? Learners brainstorm and record ideas — use of irrigation, improved seed varieties, drones, mobile apps for market prices.

Activity 4: Data Collection and Writing

- Learners collect data by interviewing a parent, guardian, or neighbour: 'What agricultural activities do you or your community do?' Record findings.
- Write a short paragraph (4–6 sentences) on the importance of agriculture in their local community.

REAL-LIFE LINK (Zambian Context)

- Zambia's major crops include maize, groundnuts, cassava, soya beans, and tobacco — learners can relate to these from their homes or communities.
- The Farmer Input Support Programme (FISP) is a real government initiative that subsidises farming inputs. This connects national policy to agriculture.
- Agricultural exports (tobacco, flowers, soya) contribute to Zambia's foreign exchange — link to Economics and current events.

CROSS-CUTTING ISSUES

- Entrepreneurship: Farming as a business — farmers sell produce for income, creating entrepreneurial opportunities.
- Numeracy: Calculating yields, income from crop sales, cost of inputs.
- Environmental Sustainability: Agriculture impacts land use, water, and biodiversity.
- HIV/AIDS: Agricultural productivity may be affected when adult farmers are ill — link to community health and food security.

FORMATIVE ASSESSMENT CHECK

- Exit question: 'Write one way agriculture provides food security in Zambia and one way its underdevelopment causes problems.'
- Peer review: Swap written paragraphs with a partner and give one positive comment and one improvement suggestion.
- Observation: Does the learner actively participate in group discussion and contribute relevant ideas?

DIFFERENTIATION STRATEGIES

Support (Struggling Learners)	Extension (Fast Finishers)
Provide a partially completed chart on the importance of agriculture for learners to fill in.	Research and present a case study of a successful Zambian farmer or agricultural business.
Use picture prompts to help identify agricultural activities.	Design an innovative agricultural project that could be implemented in their community.

REFLECTION PROMPT FOR LEARNERS

- What is the most important role of agriculture in Zambia — and why did you choose that one?

- If you could improve one aspect of agriculture in your community, what would it be and how?

TEACHER FACILITATION NOTES

Use Socratic questioning throughout — avoid giving answers directly. Let learners discover through discussion.

Ensure gender-responsive participation: call on both boys and girls equally. Avoid assumptions that only boys are interested in farming.

1.1.2.1 Agricultural Activities in Zambia

Topic: 1.1 Agriculture in Zambia

SPECIFIC COMPETENCE

Explore the main agricultural activities in Zambia

LEARNING OUTCOMES

Learners will be able to: investigate and describe the main agricultural activities in Zambia including crop production, animal production, aquaculture, and apiculture; give examples of crops and animals associated with each activity.

RESOURCES

Textbook, pictures or charts showing different agricultural activities, local newspaper agricultural supplements, internet (if available).

STARTER ACTIVITY (5–10 minutes)

Hold up pictures (or draw on board) of a fishpond, a beehive, a crop field, and a cattle pen. Ask: 'What is happening in each picture?' Learners identify the agricultural activity.

Quick-write: Learners list as many agricultural activities as they can in 2 minutes. Share and compile a class master list on the board.

MAIN LEARNING ACTIVITIES

Activity 1: Investigating Agricultural Activities

- Introduce the main agricultural activities: Crop Production, Animal Production (cattle, poultry, pigs, goats, sheep, rabbits), Aquaculture (fish farming), Apiculture (beekeeping).
- Learners work in groups, each assigned one activity. They investigate: What is it? Where in Zambia is it common? What are the main products?
- Groups report back. Create a large class chart with all activities, examples, and products.
- Teacher explains agro-ecological zones and which activities suit which zones in Zambia (e.g. cattle ranching in Southern Province, aquaculture in areas near rivers/dams).

Activity 2: Classifying Crops

- Present a list of crops: maize, groundnuts, cassava, soya beans, cabbage, citrus, tomatoes, rape. Learners classify them into food crops, cash crops, or both.
- Discuss: What is the difference between subsistence farming (growing for home use) and commercial farming (growing for sale)?
- Learners complete a simple table: Crop | Type (Food/Cash) | Zambian Province Where Common.

Activity 3: Field Observation (or Virtual Tour)

- If possible, walk to observe a school or community garden, chicken run, or nearby farm. Learners note what they observe and which agricultural activity it represents.
- If a physical visit is not possible, use photographs or a video clip to simulate the experience.
- Learners write a short observation report: 'I observed... This is an example of... because...'

REAL-LIFE LINK (Zambian Context)

- Cassava and maize are staple foods in most Zambian households — linking crop science to food on learners' plates makes content immediately meaningful.
- Fish farming (aquaculture) is growing rapidly in Zambia, especially in Luapula, Northern, and Western Provinces — a modern and entrepreneurial activity.
- Honey from apiculture is sold in local markets and supermarkets — a tangible entrepreneurship connection.

CROSS-CUTTING ISSUES

- Entrepreneurship: Beekeeping, fish farming, and poultry are viable small businesses for young people.
- ICT: Learners can use mobile phones to research crop prices, fish farming techniques, or watch short farming videos.
- Zambian Culture and Heritage: Traditional farming practices and crops are part of Zambia's cultural identity.

FORMATIVE ASSESSMENT CHECK

- Quick quiz: Name two crop production activities and two animal production activities practiced in Zambia.
- Product: Completed classification table of crops.
- Observation checklist: Did the learner contribute to group investigation?

DIFFERENTIATION STRATEGIES

Support (Struggling Learners)	Extension (Fast Finishers)
Provide a pre-drawn classification table with some entries already filled in.	Research an emerging agricultural activity in Zambia and present it to the class with pros and cons.
Use picture cards matching crops to their type.	Create a map of Zambia showing which agricultural activities are most common in each province.

REFLECTION PROMPT FOR LEARNERS

- Which agricultural activity would you most like to be involved in as a career? Why?
- How do different agricultural activities contribute to food security in Zambia?

TEACHER FACILITATION NOTES

If a school garden is available, this is an excellent opportunity for the supervised agricultural experience (SAE) component of the CBC Three-Circle Model.

1.1.3.1 Factors that Influence Agricultural Development in Zambia

Topic: 1.1 Agriculture in Zambia

SPECIFIC COMPETENCE

Explore factors that influence agricultural development in Zambia

LEARNING OUTCOMES

Learners will be able to: identify and explain environmental, social, economic, and technological factors affecting agricultural development; locate agro-ecological zones and farming suitability areas on a map of Zambia; identify agencies and organisations that support farmers.

RESOURCES

Map of Zambia, coloured pens, textbook, newspapers with agricultural news, list of farming agencies (ZNFU, ZARI, Agri-SA).

STARTER ACTIVITY (5–10 minutes)

Pose a scenario: 'A farmer in Luapula wants to start growing wheat. Will this be easy? What problems might she face?' Learners predict the challenges.

Class brainstorm: What factors affect whether farming is successful? Record all ideas. Introduce the four categories: Environmental, Social, Economic, Technological.

MAIN LEARNING ACTIVITIES**Activity 1: Analysing Factors — Expert Jigsaw**

- Divide learners into four groups, each assigned one factor category: Environmental (rainfall, soil type, pests, temperature), Social (culture, labour, education, land tenure), Economic (capital, market access, credit, input costs), Technological (mechanisation, irrigation, improved seeds, ICT).
- Each group becomes 'experts' on their factor. They prepare a brief presentation explaining how their factor affects farming and give a real Zambian example.
- Regroup so each new group has one expert from each category. Experts teach their peers.
- Class debrief: Which factors are most challenging for small-scale farmers in Zambia?

Activity 2: Mapping Zambia's Agro-Ecological Zones

- Provide or draw a simple outline map of Zambia. Teacher explains the three agro-ecological regions: Region I (low rainfall, Southern/Western), Region II (moderate rainfall, Central/Eastern), Region III (high rainfall, Northern/Luapula/Northwestern).
- Learners shade and label the map showing: main agro-ecological zones; areas less suitable for dairy farming and ranching; areas less suitable for maize cultivation.
- Discuss: Why is maize not grown everywhere? What crops suit drier regions?

Activity 3: Farming Support Organisations

- Discuss: Even with good factors, farmers need support. Present key organisations: ZNFU (Zambia National Farmers Union), ZARI (Zambia Agriculture Research Institute), Ministry of Agriculture, NGOs, banks offering agricultural loans.
- Learners match each organisation to the type of support it provides (e.g. research, advocacy, credit, training).

REAL-LIFE LINK (Zambian Context)

- Flooding in Southern Province in some years and drought in others are real environmental factors learners may have experienced or heard about.
- The FISP programme is an economic intervention — learners can discuss whether it reaches the farmers who need it most.
- The use of mobile apps for weather forecasting (e.g. Zamseed, Esoko) demonstrates technological factors in practice.

CROSS-CUTTING ISSUES

- Environmental Sustainability: Climate change is an environmental factor increasingly affecting Zambian agriculture.
- Critical Thinking: Analysing which factors are most important and why requires higher-order thinking.
- Careers: ZARI, the Ministry of Agriculture, and agribusinesses all employ agricultural scientists.

FORMATIVE ASSESSMENT CHECK

- Map assessment: Correctly label agro-ecological zones and suitability areas on a map of Zambia.
- Short answer: Name one environmental, one economic, and one technological factor and explain how each affects farming.
- Conversation: Ask individual learners to explain one factor in their own words.

DIFFERENTIATION STRATEGIES