

## APICULTURE AND AQUACULTURE

**UNIT CODE: 0831 441 27A**

**TVET CDACC UNIT CODE: HE/CU/AHP/CC/23/5/MA**

### **Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Apply knowledge of apiculture and aquaculture.

**UNIT DURATION: 50 Hours**

### **Unit Description**

This unit specifies the competencies required by an animal health and production technician to apply knowledge of apiculture and aquaculture. It involves selecting and establishing an apiary site, preparing hive equipment, monitoring and managing swarming, rearing queen bees, performing apiary maintenance, conducting bee feeding, preparing and maintaining bee records, carrying out harvesting, grading, processing, packaging, and marketing, selecting and establishing fish pond, monitoring and managing fish health, conducting fish feeding and rearing fingerlings.

### **Summary of Learning Outcomes**

By the end of this unit, the learner should be able to:

<b>S/No</b>	<b>Learning Outcomes</b>	<b>Duration (Hours)</b>
1.	Select and establish an apiary site	5
2.	Prepare hive equipment	2.5
3.	Monitor and manage swarming	5
4.	Rear queen bee	2.5
5.	Perform apiary maintenance	5
6.	Conduct bee feeding	2.5
7.	Prepare and maintain bee record	2.5
8.	Carry out harvesting, grading, processing, packaging and marketing	5
9.	Select and establish fish pond	5
10.	Monitor and manage fish health	5

11.	Conduct fish feeding	5
12.	Rear fingerlings	5
<b>Total</b>		<b>50</b>

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcomes	Content	Suggested Assessment Methods
1. Select and establish Apiary site	1.1 Apiary site selection 1.2 Apiary set up 1.3 Types of hive <ul style="list-style-type: none"> <li>1.3.1 Log hive</li> <li>1.3.2 Langstroth hive</li> <li>1.3.3 Kenya top bar hive</li> </ul> 1.4 Bee species <ul style="list-style-type: none"> <li>● <i>Apis mellifera yemenitica</i></li> <li>● <i>Apis mellifera scutellata</i></li> <li>● <i>Apis mellifera littorea</i></li> <li>● <i>Apis mellifera monticola</i></li> <li>● Hybrid species (of A.m. littorea and monticola)</li> </ul> 1.5 PPEs <ul style="list-style-type: none"> <li>● Bee gloves</li> <li>● Veils</li> <li>● Bee suit</li> <li>● Gum boots</li> <li>● Aprons</li> </ul> 1.6 Tools used in apiary <ul style="list-style-type: none"> <li>● Hammer</li> <li>● Pliers</li> <li>● Cutting tools</li> <li>● Uncapping knife</li> <li>● Comb cutter</li> </ul>	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>

2. Prepare hive equipment	2.1 Types of bee colony 2.2 Hive equipment	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> </ul>
	<ul style="list-style-type: none"> <li>● Hive equipment</li> <li>● Bee brush</li> <li>● Catcher box</li> <li>● Bee propolis trap collector</li> <li>● Honey warmer</li> <li>● Clearer board</li> <li>● Double sieve</li> <li>● Refractometer</li> <li>● Uncapping tray</li> <li>● Wax melter</li> <li>● Dip tank/ vat</li> <li>● Roller/ mold</li> <li>● Hives (log, top bar, box, pot, langstroth) equipment preparation</li> </ul>	<ul style="list-style-type: none"> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>
3. Monitor and manage swarming	3.1 Colony management 3.1.1 Swarming 3.1.2 Nuptial flight 3.1.3 Migration 3.1.4 Absconding 3.1.5 Supersedure 3.2 Swarm prevention 3.3 Swarm bees capturing	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>
4. Rear queen bee	4.1 Parent colony selection 4.2 Method of queen rearing 4.3 Queen rearing equipment 4.4 Queen rearing program 4.5 Queen transportation	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>

5. Perform apiary maintenance	5.1 Apiary maintenance during the dearth period 5.1.1 Supplementation 5.1.2 Disease control	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> </ul>
	5.1.3 Pest control 5.2 Bee diseases and pests <ul style="list-style-type: none"> <li>● Bee paralysis virus</li> <li>● Sacbrood virus</li> <li>● Deformed wing virus</li> <li>● Slow bee paralysis virus</li> <li>● Tobacco ringspot virus</li> <li>● Colony collapse disorder</li> <li>● Stonebrood</li> <li>● Chalk brood</li> <li>● Nosema</li> <li>● PESTS (small hive beetles SHB, tracheal mite, wax moths, mice, toad/ frogs, ants, humans, varroa mites, lizard, birds, honey badger, wax moth, pirate wasp, bee louse</li> </ul> 5.3 Apiary maintenance during pre-season 5.4 Apiary maintenance during main season 5.5 Apiary maintenance during post season	<ul style="list-style-type: none"> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>
6. Conduct bee feeding	6.1 Feed ration preparation 6.2 Feeding method selection 6.3 Bee is feeding	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>

7. Prepare and maintain bee record	7.1 Bee records 7.2 Inventory of apiary and equipment 7.3 Work schedule preparation	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>
8. Carry out harvesting, grading, processing, packaging and marketing	8.1 Hive products harvesting <ul style="list-style-type: none"> <li>7.1.1 Propolis harvesting</li> <li>7.1.2 Wax harvesting</li> <li>7.1.3 Bee venom</li> <li>7.1.4 Royal jelly</li> <li>7.1.5 Bee pollen</li> </ul> 7.2 Bee products post-harvest processing	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>

<p>9. Select and establish fish pond</p>	<p>9.1 Fish pond site selection</p> <p>9.2 Pond size determination</p> <p>9.3 PPEs</p> <ul style="list-style-type: none"> <li>● Gloves</li> <li>● Gum boots</li> <li>● Aprons</li> </ul> <p>9.4 Equipment selection and pond set up</p> <p>9.5 Equipment used in fish pond establishment</p> <ul style="list-style-type: none"> <li>● Pond liner</li> <li>● Pond filter</li> <li>● Pond plant</li> <li>● Pond pump and fish elevator</li> <li>● Fish grader</li> </ul> <p>9.6 Tools used in fish pond establishment</p> <ul style="list-style-type: none"> <li>● Digging tool</li> <li>● Leveling tool</li> <li>● Desilting tool</li> <li>● Net and traps (fingerling seine, fingerling suspension net, gillnet seine)</li> <li>● Screens on water control</li> <li>● Harvesting bag net</li> <li>● Analysis kit</li> </ul> <p>9.7 Fish species selection</p> <ul style="list-style-type: none"> <li>● Nile perch</li> </ul>	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>
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	<ul style="list-style-type: none"> <li>● Common carp</li> <li>● Nile tilapia</li> <li>● Black bass</li> <li>● Omena</li> </ul> <p>9.8 Stocking rate</p> <p>9.9 Water quality</p> <p style="padding-left: 20px;">9.9.1 Water temperature</p> <p style="padding-left: 20px;">9.9.2 Oxygen</p> <p style="padding-left: 20px;">9.9.3 P.H.</p> <p>9.10 Fingerlings sourcing and transportation</p>	
10. Monitor and manage fish health	<p>10.1 Feeding habit</p> <p>10.2 Reproduction behavior in fish</p> <p>10.3 Diseases affecting fish</p> <ul style="list-style-type: none"> <li>● Viral esocid</li> <li>● Lymphosarcoma</li> <li>● Lymph virus</li> <li>● Common mouth rot, tail rot</li> <li>● Colunaris</li> <li>● Swim bladder infection</li> <li>● Environmental dropsy</li> </ul> <p>10.4 Diseases and parasites management</p> <p style="padding-left: 20px;">10.4.1 Sanitation</p> <p style="padding-left: 20px;">10.4.2 Use of chemicals</p>	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>
11. Conduct fish feeding	<p>11.1 Feeding method in fish pond</p> <p>11.2 Feed ration preparation</p> <p>11.3 Fish feeding based on nutritional need, age and purpose of production</p>	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>

12. Rear fingerlings	12.1 Method of rearing 12.2 Species selection 12.3 Fingerlings transportation 12.4 Feeding regime 12.5 Fingerlings harvesting and processing	<ul style="list-style-type: none"> <li>● Practical</li> <li>● Project</li> <li>● Written tests</li> <li>● Third party report</li> <li>● Portfolio of evidence</li> <li>● Oral questions</li> </ul>
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### Suggested Methods of Delivery

- Practical
- Projects
- Demonstrations
- Group discussion
- Direct instructions

### Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/Specification	Quantity	Recommended Ratio (Item: Trainee)
<b>A</b>	<b>Learning materials</b>			
1.	Projector	EPSOM	1	1:25
2.	Whiteboard/smartboard	2.5 By 1.5.M	1	1:25
3.	Desktop/computer		1	1:25
<b>B</b>	<b>Learning Facilities &amp; Infrastructure</b>			
4.	Lecture/Theory room	Well-lit with 25 seats	1	1:25
5.	Library	Equipped with soil science books and E- section	1	
6.	Bee hives		25	1:1
7.	Fish pond		5	1:5
<b>C</b>	<b>Consumable Materials</b>			
8.	Fish species		Enough	-
9.	Bee species		Enough	-
<b>D</b>	<b>Tools and Equipment</b>			
10.	Bee suits		25	1:1
11.	Honey extractor		25	1:5
12.	Bee smokers		25	1:1

13.	Bee brush		25	1:1
14.	Bee venom collector		25	1:1
15.	Double sieve honey strainer		25	1:1
16.	Propolis trap collector		25	1:1
17.	Hive knife		25	1:1
18.	Digging tool		25	1:1
19.	Leveling tool		25	1:1
20.	Desilting tool		25	1:1
21.	Net and traps		5	1:5
22.	Screens on water control		5	1:5
23.	Harvesting bag net		25	1:1
24.	Analysis kit		5	1:5
25.	Pond liner		5	1:5
26.	Pond filter		5	1:5
27.	Pond plant		5	1:5
28.	Pond pump and fish elevator		5	1:5
29.	Fish grader		5	1:5