



## APICULTURE COMPETENCIES NEEDED AMONG AGRICULTURAL SCIENCE TEACHERS IN POST BASIC PUBLIC SECONDARY EDUCATION IN BAYELSA STATE

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### Abstract

*The study examines apiculture competencies needed among agricultural science teachers in Post Basic Public Secondary Education in Bayelsa State. The objectives of the study were to examine the competencies in queen rearing management, beehive management, and colony management in apiculture needed among male and female agricultural science teachers in Post Basic Public secondary education in Bayelsa State. Three research questions were stated. Descriptive survey design was used to carry out this study and 274 agriculture science teachers in all the nine (9) Educational Zones of Bayelsa State is used as population for the study. No sampling was done due to the small size of the population; the entire 274 agricultural science teachers were used composing of 208 male and 67 female teachers in the nine (9) educational Zones of Bayelsa state. The instrument for the data collected was a structured questionnaire containing 56 items. The statistical method used for data analysis was mean and standard deviation. The findings of the study showed that queen rearing management, beehive management, and colony management are competencies in apiculture needed among male and female agricultural science teachers in Post Basic Public secondary education in Bayelsa State. It was recommended among others that the needed competencies identified by this study be packaged and used to retrain teachers of Agriculture in order to make them meet the training needs of their students and adequately motivate their interest in the farming profession.*

**Keywords:** Apiculture, Competencies, Agricultural Science, Post Basic Education

### Introduction

Apiculture is a branch in agriculture that has gained very low recognition in modern times. It is an aspect of agriculture that when practiced can yield optimum benefit and capable of alleviating rural poverty due to its meagre resources required in its establishment. Apiculture is a diversified and unique aspect that even the poorest farmer can utilize to reduce poverty and increase wealth. In this age of technology, apiculture has been seen as a lucrative venture in agriculture and is one of the major agricultural venture farmers establish into for high profit if the modern practice is been utilized. Apiculture is derived from the Latin word 'apis', which means bee. The name apiculture was derived from the scientific (generic) name of the honeybees which is 'Apis'. Apiculture, according to Labe (2017), is the science of beekeeping. It is the art and science of raising, reproducing, and controlling honeybee colonies in artificial hives for commercial purposes. Apiculture is the scientific rearing of bees in a specially designed wooden box without damaging the product of the honey bees. The method of apiculture is based on scientific

facts which have been developed after extensive studies of bee behaviour, their functioning, and mode of reproduction. Bees are commercially grown in apiaries, which are areas where beehives are kept, in apiculture. An apiary is set up in places with enough bee pastures, which are generally locations with blooming plants.

Bees comprises of four species under a single genus called Apis (apis =bee) which are Apisdorsata (The rock- bee), Apisindica (The Indian bee), Apisflorea (The little bee), and Apismellifera (The European bee) (Labe 2017). Apiarists keep bees for the purpose of harvesting honey and other bee products (beeswax, bee pollen, flower pollen, propolis, and royal jelly). It is also reared for the purpose of utilizing it for pollination of crops, commercialization, and consumption. The home of the bee is referred to as apiary or "bee yard. Bees are essential livestock's that serves as agent of pollination and source of food to numerous plants. Yogi (cited in Nwankwo 2017) observe that the importance of bees cannot be over-emphasised as it aids in the development of four vital nutrients for humans (fruit, vegetable, oil seeds, and legumes), and most plants rely on pollination by bees to reproduce.

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Apiculture is an important source of nutritional, economic, and ecological security, as well as a source of revenue. Through apiculture honey is being produced, biodiversity is being maintained and stable, it also serves as a source of food and medicine to both animals and humans.

Apiculture farming is an aspect of agriculture that helps to balance the ecological, social, and economic horizon and improves soil fertility. It is been recognized locally and internationally in world market and pharmaceutical industries utilizes it in the production of drugs and cosmetics (Mujuni, Natukunda, and Kugonza 2012). On like other agricultural farming such as livestock, poultry, and fish farming, apiculture is a venture that requires minimal resources and low human resources which makes it easy for its establishment by women, youths, disable, and the elderly. Considering the impact of bees on all aspect of human endeavour and as a new technology, it is very necessary to improve the competencies in apiculture so that there is a steady supply of honey and other bee products.

The need for competence cannot be over-emphasized because it's very essential in acquiring the skills in any agricultural activity. Competence is defined as a set of behaviours that involves a constitution of skills, knowledge, and abilities utilized to operate in an organization. Olaitan (cited by Nwankwo 2017) think that a person have the necessary knowledge, abilities, and attitude to do well at his job. Competency may also refer to the state of being adequate or possessing knowledge, skill, or strength (for a particular job). Nwankwo emphasizes that competence is defined as a collection of specified behaviors that serve as a systematic guide for identifying, evaluating, and developing behaviors in individual employees. Ezeoba et al (cited in Nnodim and Johnwest 2016) describes competency as a condition of being able to perform specific tasks, demonstrate knowledge, skill, and abilities to a required standard. It is an evidence of acquired knowledge and skills that enables one to perform task in a wide variety of situation.

As observed by Nicholas and Wim (2018) apiculture involves much more than just rearing and production of bees in a hive and harvest honey comb. It involves efficiently and effectively sustaining and managing the bee colony which requires the use of modern equipments and applying appropriate technical apiculture knowledge and skills and accessing profitable markets. Meanwhile, Harbor and Harvis (cited in Nwankwo 2017) noted that for the fact that apiculture is a new innovation in farming, it requires certain competencies such as the yearly bee cycle, cleanliness, and equipment assembly, hive location, identification of bees from other insects that are similar to bees, development cycle of bees, feeding pattern, rearing of the queen, hive records, locating sources of nectar or pollen, use of protective gears, identifying brood partners, apiary setup, swarm control, treatment of stings and acknowledgment of unwelcome visitors.

The study identified the following apicultural competencies in queen rearing, beehive management, and colony management.

When these apiculture abilities are improved via training, bee output increases, and beekeepers become more entrepreneurial, reducing poverty and raising farmers' living standards. Teachers of agricultural science need to acquire the competencies to perform successfully in and become competent in imparting the necessary knowledge in apiculture to would be apiarist.

Agricultural science is vocational and practical-oriented subject that is geared towards skill acquisition. The teaching of agricultural science requires practical activities and experiences on the field. It's taught to students at the basic, post-basic, and tertiary education levels. The three stages of education in Nigeria are basic education (nine years), post-basic/senior secondary education (three years), and higher education (four years) (four to six years, depending on the course of study). The post-basic education is the senior secondary school level that takes three years for conclusion (National Policy on Education 2014). National Curriculum Council (NCC) noted that agricultural science is taught at the secondary level with the express purpose of igniting and maintaining students' interest in agriculture, as well as serving as a foundation for the promotion of agriculture as a career choice for students (NCC, 2009). Because of the role agriculture plays in promoting self-reliance, food production, and the supplying agro-allied businesses with raw materials, the teaching of agriculture has been given a huge momentum in our schools and primary focus by the Federal Government (Ekeyi cited in Rabi 2016).

Agricultural science offers countless opportunities for youths to be empowered economically but needs certain knowledge, skills, and abilities to be efficient and productive which can be acquired through experienced and well-trained teachers of Agricultural Science of which apiculture is not an exemption. The skills required for the rearing and breeding of bees were expected to be inculcated to students at the secondary school level, especially at the senior secondary schools levels. Regrettably, it has been observed that students graduate from the secondary schools without acquiring the relevant competencies for apicultural farming (Rabi 2016).

## Statement of the Problem

Teacher competence is one of the elements undermining school performance and learning outcomes in all educational sectors. According to Nair (2017), teaching is a noble yet difficult profession. Teachers must take ownership of their own performance, development, and growth in order to uphold a high standard of professional performance. The most important elements of the educational system are teachers, and how well they educate students depends on their competency and other factors. Hence, they must possess the competencies required to attain the objectives based on the National Policy on Education (2014) that stated thus: graduates from secondary school should be able to cultivate two crops and rear two animals. It is expected that while in secondary school students have been taught skills in apiculture to enable them focus not only on rearing of goats and poultry etc but also in honey production to make a living

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after graduation. These skills can only be made available to them through experienced and well-trained teachers. But on the contrary, teachers of agricultural science in secondary schools focus on teaching students the techniques of rearing birds and goat.

Despite all the benefits of apiculture technology to man with the small “take-off” funds, non-complex and non-tedious nature as against crop or livestock farming, apiculture farming has not received the desired recognition and is not taught by agricultural science teachers in secondary schools. Teachers rather emphasize on the traditional practice of bee production with the use of crude tools and materials both in production and processing. Probably they are ill-equipped and lack the competency in the teaching of apiculture. Moreover, continuous utilization of traditional tools and practices has detrimental effects on the environment, honey bee population (destroys the bee brood and combs), lowers quality and quantity of hive products, and reduced economic gains in honey production. Moreso, graduates of agricultural science do not delve into the business of apiculture as it is seen in other areas in agriculture and for that fact it can be deduced that probably they are not equipped in that aspect of agriculture, and such knowledge were not imparted to them by teachers and as such, they lack interest in apiculture farming. Hence it is very necessary that teachers are assessed to determine if it is due to lack of competencies that has prompted them in teaching traditional method and utilization of traditional tools in the practice of beekeeping.

#### **Purpose of the study**

1. Competencies needed in queen rearing management among male and female agricultural science teachers in Post Basic public secondary education in Bayelsa State
2. Competencies needed in beehive management among male and female agricultural science teachers in Post Basic public secondary education in Bayelsa State.
3. Competencies needed in colony management among male and female agricultural science teachers in Post Basic public secondary education in Bayelsa State.

#### **Research Questions**

1. What are the competencies needed in queen rearing management among male and female teachers of agricultural science in Post Basic public secondary education in Bayelsa State?
2. What are the competencies needed in beehive management among male and female teachers of agricultural science in Post Basic public secondary education in Bayelsa State?
3. What are the competencies needed in colony management among male and female teachers of

agricultural science in Post Basic public secondary education in Bayelsa State?

#### **Hypothesis**

1. There is no significance difference between the mean scores of the responses of male and female agricultural science teachers on the competencies needed in queen rearing management among agricultural science teachers in Post Basic public secondary education in Bayelsa State.
2. There is no significance difference between the mean scores of the responses of male and female agricultural science teachers on the competencies needed in beehive management among agricultural science teachers Post Basic public secondary education in Bayelsa State.
3. There is no significance difference between the mean scores of the responses of male and female agricultural science teachers on the competencies needed in colony management among agricultural science teachers in Post Basic public secondary education in Bayelsa State.

#### **Methodology**

For this investigation, a descriptive survey design was used. The design is further necessary as it aids the study in gathering information about people's views, beliefs, habits, or other educational or social trends. The study population was composed of 274 agricultural science teachers teaching in the nine (9) Educational Zones of Post Basic Public Secondary Schools in Bayelsa State. Due to the size of the population that the researcher can easily manage, the entire 274 agricultural science teachers in Post Basic Public Secondary Schools were used comprising of 208 male and 67 female teachers in the nine (9) educational Zones made up of Sagbama, Silga I, Ekeremor, Brass, Kolga, Nembe, Silga II, Yenagoa and Ogbia respectively.

To collect data, a structured questionnaire was used concerning the respondents which were designed by the researcher comprising of 56 items. The questionnaire items were rated on a 4-point Likert scale type of; Strongly Agree (4) Agree (3), Disagree (2), and Strongly Disagree (1) obtained from the research questions raised for the study. To establish the reliability of the research instrument, the questionnaire was subjected to a test-retest method on 15 similar respondents (male and female agricultural science teachers) who were not part of the population. After test-retest the instruments were subjected to a test of internal consistency to ensure its reliability. Cronbach Alpha ( $\alpha$ ) was used with overall reliability of 0.734. Mean and standard deviation was used to analyse the collected data.

## Results

**Table 1: Distribution and Retrieval of Questionnaires**

Questionnaire				
Study population	Number of questionnaire distributed	Number of questionnaire successfully retrieved	Number of questionnaire correctly filled	Percentage of correctly filled
Male teachers	208	199	196	94.2%
Female teachers	66	64	62	93.9%
<b>Total</b>	<b>274</b>	<b>263</b>	<b>258</b>	<b>94.2%</b>

A total of 208 and 66 copies of questionnaires were distributed as displayed in Table 1, out of which 199 and 64 were successfully retrieved; however, it was only 196 and 62 copies of the questionnaires that were correctly filled, therefore valid for the computation of the result for this study. This represents 94.2% and 93.9% respectively of the total questionnaire distributed, with attrition rate of 5.8%.

**Research question 1:** What are the competencies needed in queen rearing management among male and female agricultural science teachers in Post Basic Public secondary education in Bayelsa State?

**Table 1a: Mean rating of male and female agricultural science teachers' on the competencies needed in miller method of queen rearing management**

S/N	Miller Method	Male Teachers (N=196)			Female Teachers (N=62)		
		Mean	St. dev.	Decision	Mean	St. dev.	Decision
1	Trimming of comb and place at middle of a brood	3.15	1.00	Agree	3.23	.96	Agree
2	Allowing queen to lay on the extensions	2.69	.97	Agree	3.06	.97	Agree
3	Removing comb as egg start to hatch	2.73	.79	Agree	3.26	.74	Agree
4	Removing bees and cut comb larvae	3.20	.93	Agree	3.08	.94	Agree
5	Placing comb in a cell	3.45	1.04	Agree	3.24	1.04	Agree
	<b>Grand mean</b>	<b>3.04</b>		<b>Agree</b>	<b>3.16</b>		<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 1a show the mean responses of the respondents on the competencies needed in queen rearing management among male and female agricultural science teachers in the study using the Miller Method. The means of all five items for male respondents varied from 2.69 to 3.45, whereas the means of all five items for female respondents ranged from 3.06 to 3.26. This indicates that the mean was higher than the cut-off point of 2.50, suggesting that both male and female respondents agreed that all of the items were competences needed among male and female agricultural science teachers in the miller method of queen rearing management.

With a grand mean of 3.04 and 3.16, the result indicates that both male and female respondents agree on the competencies needed in the miller method of queen rearing management.

**Table 1b: Mean rating of responses of male and female agricultural science teachers on the competencies needed in alley method of queen rearing management**

S/N	Alley Method	Male Teachers (N=196)			Female Teachers (N=62)		
		Mean	St. dev.	Decision	Mean	St. dev.	Decision

6	Laying strip of comb on flat board	3.32	1.02	Agree	3.45	.97	Agree
7	Fixing comb to a strip of wood	3.25	1.01	Agree	3.18	.97	Agree
8	Building queen cells random	3.36	.95	Agree	3.15	.94	Agree
9	Destroying 2 -3 larvae	3.31	1.18	Agree	3.18	1.16	Agree
	<b>Grand mean</b>	<b>3.31</b>		<b>Agree</b>	<b>3.24</b>		<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 1b shows the mean responses of the respondents on the competencies needed in queen rearing management among male and female agricultural science teachers in the study using the Alley Method. The male respondents' data indicated that all four items had means ranging from 3.25 to 3.36, while the female respondents' data revealed that all four items had means ranging from 3.18 to 3.45. This indicates that the mean was higher above the cut-off point of 2.50, suggesting that both male and female respondents agreed that all of the items were competences needed among male vs female agricultural science teachers in the alley method of queen.

With a grand mean of 3.13 and 3.24, the results indicates that both male and female respondents agree on the competencies needed in the alley method of queen rearing management needed

**Table 1c: Mean rating of responses of male and female teachers on the competencies needed in Doolittle method of queen rearing management among male and female agricultural science teachers**

S/N	Doolittle Method	Male Teachers (N=196)		Decision	Female Teachers (N=62)		Decision
		Mean	St. dev.		Mean	St. dev.	
10	Grafting young larvae into artificial queen cell cups	3.34	1.03	Agree	3.13	1.06	Agree
11	Placing queen cell cups inside cell-building colony	3.18	.88	Agree	3.29	.94	Agree
12	Transferring queen cells to mating nuclei colonies	3.31	.82	Agree	2.94	.88	Agree
	<b>Grand mean</b>	<b>3.27</b>		<b>Agree</b>	<b>3.13</b>		<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 1c shows the mean responses of the respondents on the competencies needed in queen rearing management among male and female agricultural science teachers in the study using the doolittle method. The male respondents' data indicated that the means of all three items varied from 3.18 to 3.34. Female respondents' averages varied from 2.94 to 3.29 for all four items. This indicates that the mean was higher above the cut-off point of 2.50, suggesting that both male and female respondents agreed that all of the items were competences needed among male and female agricultural science teachers in the doolittle method of queen rearing management.

With a grand mean of 3.27 and 3.13 the results indicates that both male and female respondents agree on the competencies needed among male needed female agricultural science teachers in the Doolittle method of queen rearing management.

**Research question 2:** What are the competencies needed in beehive management among male needed female agricultural science teachers in Post Basic Public secondary education in Bayelsa State?

**Table 2a: Mean rating of the responses of male and female teachers on the competencies needed in site selection in beehive management among male and female agricultural science teachers**

S/N	Site Selection	Male Teachers (N=196)		Decision	Female Teachers (N=62)		Decision
		Mean	St. dev.		Mean	St. dev.	
13	Hanging and placing of hive	3.26	.88	Agree	3.19	.84	Agree
14	Easy access to site	3.37	.89	Agree	3.15	.78	Agree
15	Building thick hedge	3.39	.89	Agree	1.81	.95	Disagree

16	Placing beehive away from public places	3.34	.90	Agree	2.85	.84	Agree
17	Keeping hive safe from direct sunshine by shading	3.32	.95	Agree	3.35	.86	Agree
18	Protecting hive from direct wind good air circulation	3.16	1.00	Agree	2.98	.92	Agree
19	Situating the hive close to water source	3.18	.92	Agree	3.02	.90	Agree
20	Placing hive close to trees	3.12	.80	Agree	3.37	.83	Agree
21	Providing holes in hive wall	3.11	.91	Agree	1.65	.88	Disagree
22	Placing hive on higher elevation	2.88	.79	Agree	3.13	.80	Agree
23	Keeping hive away from fire	2.08	.79	Disagree	2.06	.76	Disagree
24	Establishing good water source	2.04	.89	Disagree	3.81	.74	Agree
<b>Grand mean</b>		<b>3.03</b>		<b>Agree</b>	<b>2.97</b>		<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 2a shows the mean responses of the respondents on the competencies needed in site selection in beehive management among male and female agricultural science teachers in the study. The data presented for the male respondents revealed that ten items had their means ranged from 2.88 to 3.37; meanwhile two items had their mean as 2.04 and 2.08 which is below the cut-off point of 2.50. Indicating therefore that not all the item was agreed upon as competencies needed in site selection in beehive management among male agricultural science teachers. The data presented for the female respondents revealed that ten items had their means ranged from 2.88 to 3.37; meanwhile two items had their mean as 1.81 and 2.06 which is far below the cut-off point of 2.50. Indicating therefore that not all the item was agreed upon as competencies needed among male and female agricultural science teachers in site selection in beehive management.

With a grand mean of 3.03 and 2.97, the results indicates that both male and female respondents agree on the competencies needed among male and female agricultural science teachers in site selection in beehive management.

**Table 2b: Mean rating of responses of male and female teachers on the competencies needed in hive hanging in beehive management in apiculture among male and female agricultural science teachers**

S/N	Hive Hanging	Male Teachers (N=196)		Decision	Female Teachers (N=62)		Decision
		Mean	St. dev.		Mean	St. dev.	
25	Hanging of hives and greased to prevent pests	3.31	.86	Agree	2.90	.88	Agree
26	Placing hives under well-shaded tree.	3.31	.85	Agree	2.97	.86	Agree
27	Suspending hives from wires	3.39	1.01	Agree	2.55	.90	Agree
28	Using trees or solid poles to hang hive	3.40	.99	Agree	3.05	.78	Agree
<b>Grand mean</b>		<b>3.36</b>		<b>Agree</b>	<b>2.87</b>		<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 2b shows the mean response of the respondents on the competencies needed in hive hanging in beehive management among male and female agricultural science teachers. The data presented for the male respondents revealed that the four items had their means ranged from 3.31 to 3.40. Data presented for the female respondents also shows that all the four items had their means ranged from 2.55 to 3.05. This indicates that the mean was higher than the 2.50 cut-off mark indicating therefore that the male and female respondents agreed that all the items were competencies needed among male and female agricultural science teachers in hive hanging in beehive management.

With a grand mean of 3.03 and 2.97, the results indicates that both male and female respondents agree on the competencies needed among male and female agricultural science teachers in hive hanging in beehive management

**Table 2c: Mean rating of responses of male and female teachers on the competencies needed in hive placing in beehive management among male and female agricultural science teachers in the study**

S/N	Hive Placing	Male Teachers (N=196)		Decision	Female Teachers (N=62)		Decision
		Mean	St. dev.		Mean	St. dev.	
29	Placing weak hives on sturdy stands	3.40	.86	Agree	2.71	.88	Agree
30	Placing hives to be accessed from behind	3.07	.87	Agree	3.10	.90	Agree
31	Sturdy and high	3.26	.96	Agree	3.13	.90	Agree
32	Placing hives high to prevent ant	2.99	1.00	Agree	2.90	.88	Agree
33	Applying oil band and ash	2.71	.87	Agree	3.11	.88	Agree
34	Applying rat guards around stand of hive	3.05	.85	Agree	2.92	.88	Agree
35	Providing shelter for hives	2.96	.85	Agree	3.19	.90	Agree
36	Keeping hives free of insects	2.23	.83	Disagree	3.23	.82	Agree
37	Placing hives along swarming routes	3.17	.93	Agree	3.05	.83	Agree
38	Transferring bees to colony	3.31	.91	Agree	3.27	.69	Agree
39	Dividing an existing colony.	2.95	.79	Agree	3.23	.78	Agree
	<b>Grand mean</b>	<b>3.11</b>		<b>Agree</b>	<b>2.94</b>		<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 2c shows the mean responses of the respondents on the competencies needed in hive placing in beehive management in apiculture among male and female agricultural science teachers. The data presented for the male respondents revealed that ten items had their means ranged from 2.71 to 3.40; meanwhile one item had its mean as 2.23 which is below the cut-off point of 2.50. Indicating therefore that ten items were agreed upon as competencies needed in hive placing in beehive management in apiculture by male agricultural science teachers. The data presented for the female respondents revealed that all the eleven items had their means ranged from 2.71 to 3.27; which is above the cut-off point of 2.50. Indicating therefore that the entire items were agreed upon as competencies needed among male and female agricultural science teachers in hive placing in beehive management.

With a grand mean of 3.11 and 2.94, the results indicates that both male and female respondents agree on the competencies needed among male and female agricultural science teachers in hive hanging in beehive management

**Table 2d: Mean rating of responses of male and female teachers on the competencies needed in painting and coloring in beehive management among male and female agricultural science teachers**

S/N	Painting and Coloring	Male Teachers (N=196)		Decision	Female Teachers (N=62)		Decision
		Mean	St. dev.		Mean	St. dev.	
40	Protecting hives using paint to color	1.86	.81	Disagree	2.69	.74	Agree
41	Diverse colors to paint hive entrances	3.06	.91	Agree	3.27	.80	Agree
	<b>Grand mean</b>	<b>2.45</b>		<b>Disagree</b>	<b>3.00</b>		<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 2d shows the mean responses of the respondents on the competencies needed in painting and coloring in beehive management in apiculture by male and female teachers of agricultural science in the study. The data presented for the male respondents has item 40 has a mean of 1.86 meanwhile item 41 also has a mean of 3.06 which is above the cut-off point of 2.50. Indicating therefore that item 41 was agreed upon as competencies needed in painting and coloring in beehive management in apiculture by male agricultural science teachers. The data presented for the female respondents revealed that items 40 and 41 had their mean as 2.69 and 3.27; which is above the cut-off point of 2.50. Indicating therefore that the items were agreed upon as competencies needed among male and female agricultural science teachers in painting and coloring in beehive management.

With a grand mean of 2.45, the result indicates that the male counterparts disagree on the competencies needed in painting and coloring in beehive management among male and female agricultural science teachers. With a grand mean score of 3.00, the female respondents agree on the competencies needed among male and female agricultural science teachers in painting and coloring in beehive management

**Table 2e: Mean rating of responses of male and female teachers on the competencies needed in hive component in beehive management among male and female agricultural science teachers in the study**

S/N	Hive Components	Male Teachers			Female Teachers		
		Decision	Mean	St. dev.	Decision	Mean	St. dev.
42	Providing enough space	Agree	2.90	.83	Agree	3.13	.88
43	Adding supers when bees occupy majority of combs	Agree	3.15	.83	Agree	3.34	.74
44	Removing super(s)	Agree	2.99	1.03	Agree	2.71	.81
45	Equipping hives	Agree	2.93	.83	Agree	3.29	.84
46	Adjusting hive entrance	Agree	3.10	.70	Agree	2.79	.90
47	Placing feeders of same size and capacity	Agree	3.08	.71	Agree	2.85	.84
	<b>Grand mean</b>		<b>3.03</b>		<b>Agree</b>	<b>3.00</b>	<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 2e shows the mean responses of the respondents on the competencies needed in hive component in beehive management among male and female agricultural science teachers. The male respondents' data revealed that the six items' means ranged from 2.90 to 3.15, which is higher than the cut-off value of 2.50. Indicating therefore that the six items were agreed upon as competencies needed in hive component in beehive management in apiculture by male agricultural science teachers. The data presented for the female respondents indicated that all the 6 items had their means ranged from 2.71 to 3.34; which is above the cut-off point of 2.50 respectively. Indicating therefore that the entire items were agreed upon as competencies needed among male and female agricultural science teachers in hive component in beehive management by female agricultural science teachers.

With a grand mean of 3.03 and 3.00, the results indicates that both male and female respondents agree on the competencies needed among male and female agricultural science teachers in hive components in beehive management.

**Table 2f: Mean rating of responses of male and female teachers on the competencies needed in inspection in beehive management among male and female agricultural science teachers**

S/N	Inspection	Male Teachers			Female Teachers		
		Decision	Mean	St. dev.	Decision	Mean	St. dev.
48	Reducing all movement around hives	Agree	3.11	.95	Agree	3.24	.92
49	Inspecting hive every 2 weeks to prevent predators	Agree	2.95	.88	Agree	3.31	.78
50	Monitor swarming	Agree	3.34	.81	Agree	2.98	.81
51	Checking for presence of eggs, larvae, and queen	Agree	3.06	.77	Agree	2.77	.86
	<b>Grand mean</b>		<b>3.51</b>		<b>Agree</b>	<b>3.11</b>	<b>Agree</b>

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 2f shows the mean responses of the respondents on the competencies needed in inspection in beehive management in apiculture by male and female agricultural science teachers. The data presented from the male respondents revealed that items 48 to 51 had their means ranged from 2.95 to 3.34; which is above the cut-off point of 2.50. Indicating therefore that the four items were agreed upon as competencies needed in inspection in beehive management in apiculture by male agricultural science teachers. The data presented



from the female respondents showed that items 48 to 51 had their means ranged from 2.77 to 3.24; which is above the cut-off point of 2.50 respectively. Indicating therefore that the entire items were agreed upon as competencies needed among male and female agricultural science teachers in inspection in beehive management.

With a grand mean of 3.51 and 3.11, the results indicate that both male and female respondents agree on the competencies needed among male and female agricultural science teachers in inspection in beehive management.

**Research Question 3:** What are the competencies needed in colony management among male vs female agricultural science teachers in Post Basic secondary education in Bayelsa State?

**Table 3a: Mean rating of responses of male and female teachers on the competencies needed in water supply in colony management**

S/N	Water supply	Male (N=196)		Teachers Decision	Female (N=62)		Teachers Decision
		Mean	St. dev.		Mean	St. dev	
52	Providing water	3.05	.79	Agree	2.87	.86	Agree
53	Proving water source	3.16	.96	Agree	3.00	.78	Agree
54	Provide salted water	3.10	.82	Agree	2.98	.86	Agree
	<b>Grand mean</b>	<b>3.14</b>		Agree	<b>2.97</b>		Agree

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 3a shows the mean responses of the respondents on the competencies needed in water supply in colony management in apiculture by male and female agricultural science teachers. The data presented from the male respondent's shows that items 52 to 54 had their means ranged from 3.05 to 3.16; which is above the cut-off point of 2.50. Indicating therefore that the three items were agreed upon as competencies needed in water supply in colony management in apiculture by male agricultural science teachers. The data presented from the female respondents also indicates that items 52 to 54 had their means ranged from 2.87 to 3.00; which is above the cut-off point of 2.50 respectively. Indicating therefore that the entire items were agreed upon as competencies needed in water supply in colony management.

With a grand mean of 3.14 and 2.97, the results indicates that both male and female respondents agree on the competencies needed among male and female agricultural science teachers in water supply in colony management.

**Table 3b Mean rating of responses of male and female teachers on the competencies needed in provision of food in the colony in colony management among male vs female agricultural science teachers**

S/N	Provision of food in the colony	Male (N=196)		Teachers Decision	Female (N=62)		Teachers Decision
		Mean	St. dev.		Mean	St. dev	
55	Feeding colony sugar	2.99	.74	Agree	3.32	.84	Agree
56	Placing feeders on tray	2.44	.75	Disagree	2.77	.78	Agree
	<b>Grand mean</b>	<b>2.71</b>		Agree	<b>3.05</b>		Agree

**Key: X = Mean; SD=Standard Deviation; N= Number of Respondents.**

Table 3b shows the mean responses of the respondents on the competencies needed in provision of food in the colony management in apiculture among male and female agricultural science teachers. The data presented from the male respondents revealed that one item had its means as 2.99 while the other as 2.44 is below the cut-off point of 2.50. Indicating therefore that one item was agreed upon as competencies needed in food in the colony in colony management by male agricultural science teachers. The data presented from the female respondents revealed that the two items had their means as 2.77 and 3.32; which is above the cut-off point of 2.50 respectively. Indicating therefore that the female respondents agree that all the items are competencies needed among male and female agricultural science teachers in provision of food in the colony management.

With a grand mean of 2.71 and 3.05, the results indicates that both male and female respondents agree on the competencies needed among male and female agricultural science teachers in the provision of food in the colony in colony management.

**Hypothesis 1:** There is no significance difference in the mean ratings of the responses of male and female agricultural science teachers on the competencies needed in queen rearing management among male and female agricultural science teachers in Post Basic Public secondary education in Bayelsa State.

**Table 4: T-test (t) Statistics of the Mean Responses**

Variable	N	X	SD	Df	t-cal	t-tab	s/level	Decision
Male Teachers	196	3.22	1.17	256	-.127	1.960	0.05	NS
Female Teachers	62	3.44	0.091					

**Key: X =Mean; S2 =Variance; N= Number of Respondents; NS = Not Significant; P=0.05**

The t-test analysis presented in Table 4 revealed that the t-calculated (t-cal) value of 0.127 is less than the t-table (t-tab) value of 1.960 at 0.05 levels of significance and at 256 degree of freedom (df) indicating that there is no significant difference between the mean ratings of the responses of male and female agricultural science teachers on the competencies needed among male and female agricultural science teachers in queen rearing management. This, therefore, means that the null hypothesis of no significant difference is accepted.

**Hypothesis 2:** There is no significance difference in the mean ratings of the responses of male and female agricultural science teachers on the competencies needed in beehive management among agricultural science teachers in Post Basic Public secondary education in Bayelsa State.

**Table 5: T-test (t) Statistics of the Mean Responses**

Variable	N	X	SD	Df	t-cal	t-tab	s/level	Decision
Male Teachers	196	3.51	0.47	256	-.105	1.960	0.05	NS
Female Teachers	62	3.26	0.78					

**Key: X =Mean; S2 =Variance; N= Number of Respondents; NS = Not Significant; P=0.05**

Table 5 shows that at 0.05 levels of significance and 256 degrees of freedom (df), the t-calculated (t-cal) value of 0.105 is less than the t-table (t-tab) value of 1.960, indicating that there is no significant difference between the mean ratings of male and female agricultural science teachers on the competencies they needed in beehive management. As a result, the null hypothesis of no significant difference was accepted.

**Hypothesis 3:** There is no significance difference in the mean ratings of the responses of male vs female teachers of agricultural science on the competencies needed in colony management in Post Basic Public secondary education in Bayelsa State.

**Table 4.10: T-test (t) Statistics of the Mean Responses**

Variable	N	X	SD	Df	t-cal	3t-tab	s/level	Decision
Male Teachers	196	3.37	0.47	256	-.192	1.960	0.05	NS
Female Teachers	62	2.97	1.49					

**Key: X =Mean; S2 =Variance; N= Number of Respondents; NS = Not Significant; P=0.05**

Table 6 shows that at 0.05 levels of significance and 256 degrees of freedom (df), the t-calculated (t-cal) value of 0.192 is less than the t-table (t-tab) value of 1.960, indicating that there is no significant difference between the mean ratings of male and female agricultural science teachers on the competencies needed in colony management. As a result, the null hypothesis of no significant difference has been accepted.

## Discussion of Findings

Table 1a – c indicates that both male and female teachers agree on the competencies needed among male and female agricultural science teachers in the miller method, alley method, and doolittle in queen rearing management. This finding is in line with Abebe (2008) findings who report that the modern practices in apiculture were not practiced in secondary school due to the innovation involved in rearing and breed of queen. The traditional method they use is detrimental and they refuse to realize the fact that the modern

practice allows the bee apiarist to choose and determine the stock and trait of bees to keep, when and how to de-queen and re-queen, and number of hives to keep. The findings from the hypothesis indicates that the study's p-value is greater than the significance level of 0.05, indicating that there is no significant difference between male and female agricultural science teachers' responses to the competencies needed in queen rearing management.

Tables 2a –f indicates that both male and female teachers agree on the competencies needed among male and female agricultural science teachers in selecting site, hive hanging,

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hive placing, painting, and coloring for the beehive, hive components, and inspecting in beehive management in apiculture. The study also discovered that the p-value is below the 0.05 significance level, implying that there is a significance difference between male and female agricultural science teachers on the competencies needed in beehive management. As a result, the null hypothesis has been accepted. David and Isaac (2015) posits that the competency improvement needs of teachers of agriculture in planning and hive preparation operations in beekeeping for effective teaching of students showed that they need capacity building in making a budget for beekeeping enterprise, identifying sources of finance, materials, and equipment, selecting appropriate site, fixing the equipment to specification among others.

Tables from 3a-b indicate that both male and female teachers agree on the competencies needed among male and female agricultural science teachers on water supplying and food in the colony in colony management. The results of this study were in agreement with the findings of Olaitan, Amusa, and Nwobu (2010) which revealed that the quality assurance of teachers of agriculture in Cross River State was low and they needed improvement on how to teach the following competency areas:-planning and hive preparation; stocking and management operations involved in beekeeping. The p-value is less than the significance threshold of 0.05 suggesting that there is a significant difference in the replies of male vs female agricultural science teachers in the study on the competencies needed in colony management.

## Recommendations

1. The required competencies identified by this study be packaged and used to retrain teachers of Agriculture in order to make them meet the training needs of their students and adequately motivate their interest in adopting apicultural skills.
2. Government should create enabling environment to encourage local fabrication of some of the needed productions equipment.

3. The government should employ more agricultural science teachers in apiculture as it will help to increase the number of teachers to teach the principles and practices of apiculture
4. Apiculture equipment should be provided in schools so that they may use it to enhance production and implement proper management methods for modern beehives, which will have a beneficial influence on the possibility of apiculture adoption and usage intensity.

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