International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.12 No.06, pp 147-156, 2019

Development of Apis cerana District Extractor with innovation of Machinery and Pest control in Kumelembuai Village

Joice J.I. Rompas[1]*, Betsy Agustina Naomi Pinaria[2], Ventje V. Memah[3]

[1]Faculty of Animal Sciences, Sam Ratulangi University Manado, Indonesia
[2]Faculty of Animal Sciences, Sam Ratulangi UniversityManado, Indonesia
[3]Faculty of Animal Sciences, Sam Ratulangi University Manado, Indonesia

Abstract : This study aims to: 1). Knowing the development of *Apis Cerana Honey Bees*F.with extractor engine innovation 2). Control of pests that attack honey bees 3). Obtain products from honeybees*Apis Cerana* F.produced 4). Predict to what extent the quantity and quality of royal jelly products *Apis cerana* F.produced in the development of beekeeping in North Sulawesi, especially Kumelembuai Village, South Minahasa Regency. This research is expected to develop beekeeping in North Sulawesi, specifically the local bee *Apis cerana* in Kumelembuai Village. The benefits obtained from beekeeping development activities include increasing the income and nutritional quality of the community from beekeeping products such as honey, pollen, *royal jelly*, beeswax, propolis, *bee venom*. Conservation of natural resources, honey bees play an important role in helping the process of pollinating plants, in addition to beekeeping activities can also increase public awareness to participate in conservation efforts. North Sulawesi, especially in the village of Kumelembuai, can be developed using the method*queen rearing* best because it has bright prospects for cultivation in North Sulawesi. Honey bee cultivation is very profitable, in addition to increasing agricultural production (crop yields) and producing products from bees*Apis cerana* namely honey, royal jelly, tepung sari, propolis, wax, *bee venom* which can all be utilized for human welfare. A number of studies have been carried out by various parties who feel an interest in the development of beekeeping, but the research conducted is still partial and limited to one or two environmental components, not integrated yet. It is hoped that this research can produce the best methods for developing beekeeping in the North Sulawesi kumelembu village. The research location will be conducted in the village of Kumelembuai, South Minahasa regency, North Sulawesi.
Laboratory analysis is focused on the content of royal jelly products produced by honey bees *Apis cerana* F. Based on the results of data analysis and discussion in this study are as follows.
1. Research of the four methods namely *Supersedure*, *Emergency cell*, *Miller* and *Doolittle* produce superior methods, namely the method *Emergency cell.*
2. In the method*emergency cell* artificial feeds provide queen cell formation and production*royal jelly* with a composition of 100 grams of sugar and 200 grams of water both cane sugar and palm sugar are higher than other treatments, although not significantly different.
3. Artificial feed with a composition of 200 grams of cane sugar and 200 grams of water gives a good effect on the fat content of *royal jelly Apis cerana* in the method *emergency cell.*
4. Product of *royal jelly as a* result of panelist evaluationin this study showed that the preferred odor was not pungent, slightly acidic and sticky taste on the tongue and the white color of the product of *royal jelly* honey bee *Apis cerana.*
Keywords : *Apis cerana Extractor*,machine innovation, Kumelembuai.

DOI= http://dx.doi.org/10.20902/IJCTR.2019.120619

Introduction

Beekeeping is an environmentally friendly agribusiness activity and is known to be very beneficial for improving the welfare of the community, especially people who live around honeybees development *Apis cerana* F..

According to the Director General of Land Rehabilitation and Social Forestry[1]and[2],Indonesia has several types of honey-producing bees, including *Apis hoshevinibovi*, *Apis mellifera* (Imported Bees / Europe), *Apis dorsata* (forest bees). The potential area to develop beekeeping in Indonesia is quite wide, which is around 29,359,235 ha, spread across North Sumatra, West Sumatra, Riau, Lampung, West Java, Central Java, East Java, Yogyakarta, Bali, West Nusa Tenggara, East Nusa Tenggara, Sulawesi South, Central Sulawesi and Southeast Sulawesi. While North Sulawesi is known as the local *Apis cerana bee*.

In general, currently beekeepers still cultivate with traditional technology, have limited capital and find it difficult to market products because the products produced are not in accordance with market demand, for this reason it is necessary to increase the knowledge of beekeeping skills in conducting beekeeping activities in order to produce the latest technology that reliable and efficient.This effort can support increased benefits, added value and competitiveness of beekeeping products and their derivatives, as well as supporting natural resource management activities so as to provide optimal economic and social benefits. This is where the role of researchers conducting research for the development of beekeeping.

North Sulawesi especially in the village of Kumelembuai can be developed beekeeping with the method *queen rearing* bestand extractor engine innovation because beekeeping has bright prospects cultivated in North Sulawesi. Honey bee cultivation is very profitable, in addition to increasing agricultural production (crop yields) and producing products from bees *Apis cerana* namely honey, royal jelly, tepung sari, propolis, wax, *bee venom* which can all be utilized for human welfare.

Research Method

Material and Ways of Work The

bees used are *Apis cerana* Fabricus and maintained in a wooden box. The material used is a solution of cane sugar and palm sugar that can be bought at the market, as well as water.

The work procedures carried out during the study are: (1) stimulating worker bees to form queen cells, (2) takingproduction *royal jelly*, and (3)content *royal jelly*

Stimulating worker bees to form queen cells.

This study used 24 boxes of colonies in each study box included six comb frames filled with nest cells, 1 *breeder* colony, 6 empty boxes to place queen bees for three days of observation.

Queen Rearing artificially uses the Miller Method as follows:

a. Take the frame (*frame*) that has a nest, then cut the nest foundation into a size of 5x10 cm 4 times.
b. Cut again so that it is triangular, then select a good dough and enter the miller frame.
c. Remove all the nest combs and leave for nine days, so that the worker bees can build a queen cell in the Miller frame, after which the queen will lay eggs in the queen's cells.
d. Artificial feed is given one week before observation, ie cane sugar and palm sugar are weighed then dissolved with boiling water based on the size of the treatment composition, then cooled. All artificial feed is poured into a container placed on a comb frame in the bee box. Artificial feeding is done every day at 7:00 a.m.
e. The queen bee is separated from its colony and placed in an empty box for three days followed by a comb frame filled with hive cells and part of the worker bees to take care of the queen bee.
f. Insert the Miller frame in an orphan colony box (no queen) for 3 days
g. Three days later it was observed how many queen cells were formed.
h. After that a bee colony treatment was held ie the queen bee was returned to its colony box for 4 days, before the second week of observation was carried out.

i. Observation of the second week to the fourth week of the working procedure is the same as observing the first week parts a through j.

a. *Queen Rearing* naturally using the supersedure method is as follows:

j. Artificial feed is given one week before observation ie sugar cane and palm sugar are weighed then dissolved with boiling water based on the size of the treatment, after which it is cooled. All artificial feed is poured into a container placed on a comb frame in the bee box. Artificial feeding is done every day at 7:00 a.m.
k. The queen bee colony was chosen and the queen was old.
l. Three days later it was observed how many queen cells were formed from five combs of hives because if queen cells were formed, there were bells*royal jelly*.
m. After that, a bee colony treatment is held, that is, the queen bee is returned to its colony box for four days, before the second week of observations.
n. Observation of the second to fourth week of the working procedure is the same as the first observation of parts a through d.

Production *Royal jelly*,

production *royal jelly* is closely related to basic technique of queen cell formation, because if the cell is not formed, the queen of *royal jelly* was not there. *Royal jelly is* taken / harvested by:

a. Prepare equipment for harvesting, namely knives, tweezers,containers *royal jelly*, brushesand ice flasks.
b. The process of extracting / harvesting *royal jelly is* done in the morning at 6.30 pm.
c. In the Miller method take all the Miller frames contained queen cells and in the method *supersedure* all the combs containing the queen cells are taken, clean with d. brush from the bees attached to the frame *Doolittle* / comb.
d. The queen cells in each treatment are taken and put in a different plastic.
e. The plastic is placed in an ice flask.
f. Use a knife to slice the queen cells made by bees and then each cell is cleaned of propolis.
g. Use tweezers to remove the bee larvae.
h. Use the drawing brush to remove the *royal jelly* from the queen cell and then filter it out of the dirt, then put it in the container provided.
i. *Royal jelly is* stored in a *freezer* before being taken to the laboratory to be weighed and analyzed for its contents.

Content Analysis of *Royal Jelly*.

Testing of content was *royal jelly* carried out at the Sam Ratulangi University Manado central laboratory. The methods used are micro-kjeldahl method to observe protein content, soxhlet extraction method to observe fat content and phenol method to observe sugar content (carbohydrate) and distillation method to observe water content.

Analysis Data

Of methods *miller* and *supersedure* naturally and artificially and the production of *royal jelly* were analyzed by the F test. If significantly different between the types of artificial feed according to the given composition, then continued with a sensitivity test that is BNJ. The content of *royal jelly is* analyzed chemically and the data are described descriptively[3]

Results and Discussion

Royal jelly that has ever been examined is getting small results because the cell bowl is made from the manufacturer so that it is not liked by bees *Apis cerana* and only a small amount of royal jelly is produced[4]. In this research, a bowl of cells was taken from raw materials from bees *Apis cerana* so that it would be liked and produce high-quality and high-quality royal jelly products[5].

Figure 1. Royal Jelly products taken from honey bee cells *Apis cerana* and collected in containers

Figure 2. Innovation of Extractor Machines for honey bee harvest

According to[6]*royal jelly* can treat diabetes, liver disease, fatigue, impotence, nerve weakness, tuberculosis, heart disease, ulcers and is used as a basic ingredient for cosmetic therapy ingredients.

1.Content Test *Royal Jelly*

The results of observations of the content of *royal jelly* in the method *emergency cell* that was analyzed chemically in theLaboratory of the *Advance Science* Faculty of Mathematics and Natural Sciences, Sam Ratulangi University Manado are presented in the following section.

a. Total Protein Content

Chemical analysis of the protein content of the seven treatments given to the colony *Apis cerana*, the results of descriptive analysis, normality of data testing, homogeneity of variance and analysis of variance are presented successively below (Tables 1, 2, 3 and 4).

Table 1. Descriptive Statistics ofProtein Content *Royal Jelly* with theMethod *Emergency Cell* (%).

Treatment	average	saves raw	Minimum	*Median*	Maximum
A	34.47	05:49	28.13	34.13	41.47
B	34.30	18.87	16:13	30.13	60.80
C	52.10	28.40	28.80	44.10	91.50
D	42.50	32.90	21:50	28.50	91.50
E	25.80	05:24	18:13	27.80	29.47
F	37.97	18:34	21:47	33.13	64.13
G	24.13	05:10	17:47	25.47	28.13

The above results indicate that chemical analysis of the protein content of *royal jelly* bee *Apis cerana* highest average is 52.10% C treatment is in the range of 28.80-91.50% and the lowest average was treated G is 24.13% with a range of 17.47-28.13%.

Results of normality test data for protein content of *royal jelly Apis cerana* for each treatment performed by the Shapiro-Wilk test are presented in Table 2.

Table 2. Normality Test for Total Protein Content of *Royal Jelly*

Treatment	Statistical	*Sig.* (P)	Decision
A	0.976	0.880	Spread Normal
B	0.895	0.408	Spread Normal
C	0.890	0.381	Spread Normal
D	0.731	0.025	Spread Normal
E	0.802	0.107	Spread Normal
F	0.885	0.358	Spread Normal
G	0.863	0.272	Spread Normal

Ket. Normal when sig. ≥0.05

Not normal when sig. <0.05

The results of normality test for the protein content of *royal jelly Apis cerana* show that data in the seven treatments are normally spread. Homogeneity test of various protein content of *royal jelly Apis cerana* in all treatments was carried out by *Levene's Test* and the results are presented in Table 3 below. The test results show that there are variations that are not homogeneous.

Table 3. Tests for Homogeneity in Variety in Total Protein Content of *Royal Jelly*

Levene Statistics	df1	df2	Sig.	Decision
2,626	6	21	0.046	Variety is not homogeneous

Ket. If sig. ≥ 0.05: homogeneous

If sig. <0.05: not homogeneous

The results of various homogeneity tests stated that not all variations in the protein content of *royal jelly Apis cerana* in all treatments were the same, so the hypothesis testing of the protein content was tested by nava*Kruskal-WallisTests* and results are presented in Table 4.

Table 4. Anava Total Protein Content of *Royal Jelly* (%)

Treatment	*Median*	*Mean Rank.*	χ^2	*Sig.* (p)
A	34.13	18.38		
B	30.13	14.38		
C	44.10	21.00		
D	28.50	13.88	8.843	0.183
E	27.80	9.38		
F	33.13	17.50		
G	25.47	7.00		

The test results in Table 4 state that there is no significant difference, the median of queen cells in all 7 treatments ($p = 0.183 > \alpha = 0.05$). However, Table 19 shows that the median protein content of *royal jelly* queen in treatment C was the highest protein content compared to other treatments.

[7]suggests that the protein content of *royal jelly* ranges from 11.5 to 13.0% at 20 sahuC. States that the protein content of *royal jelly* is 12.5%, whereas [8]suggests that protein is *royal jelly* 35-41%. Based on the results of the study, the protein content of the two types of *royal jelly*, namely treatment C (cane sugar) and treatment D (palm sugar) shows that the content of *royal jelly* produced is good. Although between the two treatments the

better treatment C is *royal jelly* from cane sugar because of the higher protein content seen from the median obtained.

b. Total Fat Content

Chemical analysis of fat content of the seven treatments given to the colony *Apis cerana*, Descriptive analysis results, normality data testing, homogeneity testing of variance and analysis of variance are presented successively below (Tables 5, 6 and 7).

Table 5. Descriptive Statistics of Fat Content *Royal Jelly* with the Method *Emergency Cell* (%).

Treatment	average	saves raw	Minimum	*Median*	Maximum
A	7:07	1,018	5.70	7,220	8:14
B	3.98	0.279	3.68	3.960	4:34
C	6.68	0191	6:44	6.700	6.90
D	6.76	0720	5.84	6870	7:48
E	4.88	1127	3:22	5,330	5.64
F	5:18	1041	3.94	5.210	6:38
G	5:35	1,514	3.92	5,160	7.16

The above results indicate that the chemical analysis of the fat content of *royal jelly* bee *Apis cerana* , the highest average is treatment A, which is 7.07% with a range of 5.70 - 8.14% and the lowest average yield is treatment B, which is 3.98% with a range of 3.68 - 4.34%.

Results of normality test data for fat content of *royal jelly Apis cerana* for each treatment performed by the Shapiro-Wilk test presented in Table 6.

Table 6. Normality Test for Total Fat Content *Royal Jelly*

Treatment	Statistical	Significant	Decisions
A	0956	0756	Normal Spread
B	0989	0954	Spread Normal
C	0988	0945	Spread Normal
D	0962	0788	Spread Normal
E	0782	0074	Spread Normal
F	0996	0986	Spread Normal
G	0919	0530	Spread Normal

Ket. Normal when sig. ≥0.05

Not normal when sig. <0.05

The results of normality tests for the fat content of *royal jelly Apis cerana* show that data tend to be on the seven treatments spread normally.

Homogeneity test of various fat content of *royal jelly Apis cerana* in all treatments was carried out by *Levene's Test* and the results are presented in Table 7 below. The test results show that there are variations that are not homogeneous.

Table 7. Testing the Homogeneity of the Total Variety ofFat Content *Royal Jelly*

Levene Statistics	df1	df2	Sig.	Decision
5,941	6	21	0.230	Homogeneous variety

Ket. If sig. ≥ 0.05: homogeneous

If sig. <0.05: not homogeneous

The results of normality test data in all treatments spread normally and homogeneity of the variances stated that all variations in the total fat content of *royal jelly* in all treatments were the same, then the hypothesis testing for total fat content of *royal jelly was* tested with anova F test and the results can be seen in Table 8.

Table 8. Total Anavar Fat Content *Royal Jelly* (%)

	Number of Squares	**db**	**Variance**	**F**	***Sig.*(p)**
Treatment	31,931	6	5,322	5,900	0.001
Remaining	18,942	21	0.902		
Total	50,873	27			

Variance analysis results show that the administration of cane sugar and palm sugar as artificial feed and control as a comparison to the bee colonies *Apis cerana* was significantly different between the treatment of the fat content of production. *Royal jelly* ($p = 0.001 < \alpha = 0.01$).

test results *Duncan's* showed that the highest average fat content obtained was 7.07% in treatment A significantly different from treatments B, E, F and G, except for treatments C and D that were not significantly different ie 6.68% for the treatment C and 6.76% with a range of 5.84-7.48% for the treatment D.

c. Total Water Content

Chemical analysis of water content of the seven treatments given to the colony *Apis cerana*, descriptive analysis results, normality data testing, homogeneity testing of variance and analysis of variance are presented respectively (Table 9, 10, 11 and 12).

Table 9. Descriptive Statistics of Total Water Content *Royal Jelly* by Method *Emergency Cell* (%).

Treatment	**average**	**saves raw**	**Minimum**	***Median***	**Maximum**
A	20.91	0.24	20.32	20.54	20.58
B	20:39	12:56	19.76	20:38	21:06
C	23:24	4:18	20.61	21:44	29.48
D	20.73	12:30	20:35	20.76	21:05
E	19.5920.56	0.44		20.29	20.18
F	20:14	0.65	19.61	19.93	21:10
G	20:38	0.94	19:50	20:22	21.57

The above results show that the chemical analysis of the water content of *royal jelly* bee *Apis cerana* the highest average was treatment C that was 23.24% with a range of 20.61-29.48% and the lowest average yield was treatment F which was 20.14% with a range of 19.61-21.10%.

The results of normality test data on the water content of *royal jelly Apis cerana* for each treatment performed by the Shapiro-Wilk test are presented in Table 10.

Table 10. Testing the Total Normality ofWater Content *Royal Jelly*

Treatment	Statistical	*Significant to*	Decisions
A	0.941	0.662	Spread Normal
B	0.984	0.927	Spread Normal
C	0.724	0.022	Spread Normal
D	0.982	0.916	Spread Normal
E	0.908	0.471	Spread Normal
F	0.818	0.138	Spread Normal
G	0.929	0.588	Spread Normal

Ket. Normal when sig. ≥ 0.05

Not normal when sig. <0.05

Test results for normal water content of *royal jelly Apis cerana* showed that data in the seven treatments were normally spread.

Homogeneity test of various water content of *royal jelly Apis cerana* in all treatments was carried out by *Levene's Test* and the results are presented in Table 11 below. The test results show that there are variations that are not homogeneous.

Table 11. Testing Homogeneity of Variety in Total Water Content of *Royal Jelly*

Levene Statistics	df1	df2	Sig.	Decision
6,229	6	21	0.001	Variety not homogeneous

Ket. If sig.> 0.05: homogeneous

If sig. <0.05: not homogeneous

The results of the homogeneity of the variance states that not all variations in the water content of *royal jelly Apis cerana* in all treatments are the same, then the hypothesis testing of the protein content is tested with anova *Kruskal-Wallis Tests* and results are presented in Table 12.

Table 12. Anava Total Water Content of *Royal Jelly* (%)

Treatment	***Median***	***Mean Rank.***	χ^2	***Sig.* (p)**
A	20:54	14.63		
B	20:38	13:50		
C	21:44	24.00		
D	20.76	17.75	9.163	0.165
E	20.29	9.13		
F	19.93	10.00		
G	20.22	12.50		

The test results in Table 14 state that there is no significant difference, the *median* of queen cells in the 7 treatments ($p = 0.165 > \alpha = 0.05$). However, Table 27 shows that the *median* water content of *royal jelly* in treatment F is the lowest water content compared to other treatments, because the lowest water content is the best for products *royal jelly* because it is not easy to ferment. suggests that *royal jelly* quality is low in water content.

[9]suggested that the water content in *royal jelly* is 67%. [10]suggested that the production of honey bees with low water content can avoid the occurrence of fermentation. Stated that *royal jelly* the quality that has been recognized by the *International Apimondia Competition and The Congress* 1993was less than 3%.

2. Organoleptic Test for Content *Royal Jelly*

Panelol organoleptic test results on smell, taste and color *royaljelly A. cerana* can be seen in Tables 13, 14 and 15.

a). Smell

The odor assessment by panelists on products *royal jelly* from *A. cerana* can be classified in the category of no pungent odor, because of the five panelists answered with an average score of 5 (Table 13). [11]suggested that the distinctive odor of *royal jelly* is without a pungent odor.

Table 13. Results of average Tests Appearance at Odor Royal Jelly A. cerana

Treatment	Average Test Results Panelist				
	1	**2**	**3**	**4**	**5**
A	5.00 5.00 5.00 5.00				5.00
B	5.00 5.00 5.00 5.00				5.00
C	5.00 5.00 5.00 5.00				5.00
D	5:00	5:00	5:00	5.00	5.00
E	5.00	5.00	5.00	5.00	5.00
F	5.00	5.00	5.00	5.00	5.00
G	5.00	5.00	5.00	5.00	5.00

b). Taste

The dominant organoleptic value for flavor is included in the slightly acidic and sticky category on the tongue, because of the five panelists answering with an average of ≥ 4.50. The details can be seen in Table 14.

Table 14. Average Results of Organoleptic Tests on the Taste of *Royal Jelly A. cerana*

Treatmen t	Average of Panelist Test Results				
	1	**2**	**3**	**4**	**5**
A	4.75	4.75	4.75	5.00	5.00 5.00
B	5.00	4.50	5.00	5.00	5.00 5.00
C	4.50	4.75	5:00	5:00	5:00
D	4.75	5:01	5:00	5:00	5:00
E	5.00 5.00	5.02		5.00	5.01
F	5.005.00 5.00		5.01		5.00
G	5.00 5.00 5.00 5.00				5.00

c). Color

color *Royal jellyA. Thecerana* dominant was obtained from the results of the panelist assessment which was milky white color (category 5) and there were also other yellowish white treatments (category 4). The average score of the five panelists was ≥ 4.50. That the color of *royal jelly* quality honey bee is milk white until yellowish.

Table 15. Average Results of Organoleptic Testing on Color *Royal Jelly Apis cerana*

Treatment	Average Of Panelist Test Results				
	1	**2**	**3**	**4**	**5**
A	4.75	4.75	4.75	5.00	5.00
B	5.00	4.50	5.00	5.00	5.00
C	4.50	4.75	5.00	5.00	5.01
D	4.75	5.00	5.005.005.00	5.005.005.00	5.00
E	5.00	5.00	5.00	5.01	5.00
F	5.00	5.00	5.00	5.00	5.00
G	5.00	5.00	5.00	5.00	5.00

The results of chemical analysis show that the *royal jelly Apis cerana is* moregood quality it's just less production compared to products *royal jelly Apis mellifera*. This is evidenced by the highest average percentage

of protein content in treatment C (cane sugar) reaching 52.10% with a range of 28.80% - 91.50% and treatment D (palm sugar) reaching 42.50% with a range of 21.50% - 91.50%. The highest fat content is 7.07% in treatment A (cane sugar) in the range of 5.70 - 8.14% and 6.76% in treatment D (palm sugar) with a range of 5.84 - 7.48%, but more good treatment A is *royal jelly* from cane sugar because of its higher fat content reaching 5%, while the water content *royal jelly* lowestis 20.14% in treatment F (palm sugar) with a range of 19.61 - 21.10%.

Conclusion

Based on the results of data analysis and discussion in this study, it can be concluded as follows:

1. Research from the four methods, namely *Supersedure*, *Emergency cell*, *Miller* and *Doolittle* produce superior methods, namely the method *Emergency cell*.
2. In the method *emergency cell* artificial feeds provide queen cell formation and production *royal jelly* with a composition of 100 grams of sugar and 200 grams of water both cane sugar and palm sugar are higher than other treatments, although not significantly different.
3. Artificial feed with a composition of 200 grams of cane sugar and 200 grams of water gives a good effect on the fat content of *royal jelly Apis cerana* in the method *emergency cell*.
4. Product of *royal jelly as a* result of panelist evaluation in this study showed that the preferred odor was not pungent, slightly acidic and sticky taste on the tongue and the white color of the product of *royal jelly* honey bee *Apis cerana*.

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