



# A survey on the authenticity of *Apis cerana cerana* honey in Chinese retail market

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2019-9-11





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# Introduction



# Chinese honey market situation

*Apis cerana  
cerana*



**Colonies: 3 million**  
**Honey: about 50,000 tons**  
**Honey price: ¥ 80-200/500g**

*Apis mellifera  
ligustica*



**Colonies: 6 million**  
**Honey: about 400,000 tons**  
**Honey price: ¥ 30-50/500g**

# Research purpose

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**To test the authenticity of *A. cerana*  
*cerana* honey in Chinese retail market.**





## Materials and methods



# Samples

Table 1. Honey sample information

Source	Number	Numbered
Enterprises	63	1-63
Beekeepers	18	FN1-FN18
<b>Total</b>	<b>81</b>	



# Detecting method

- SDS-PAGE method.

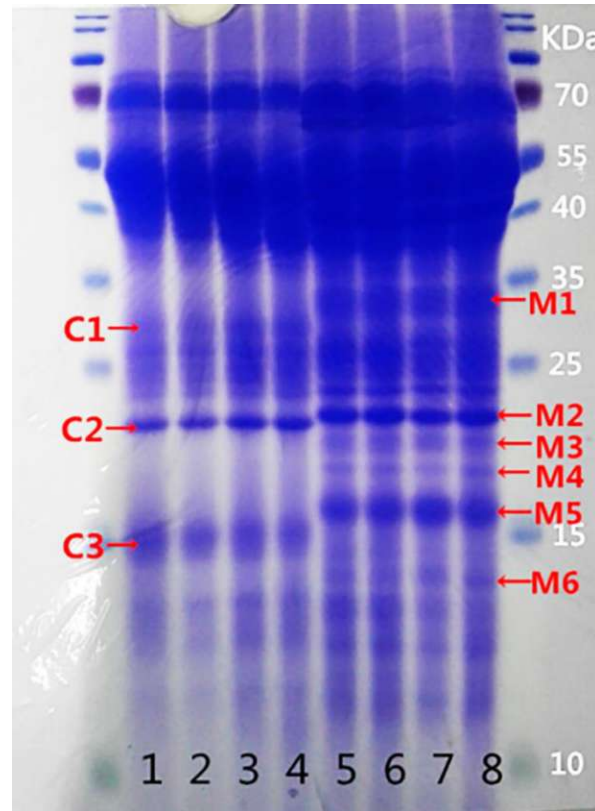
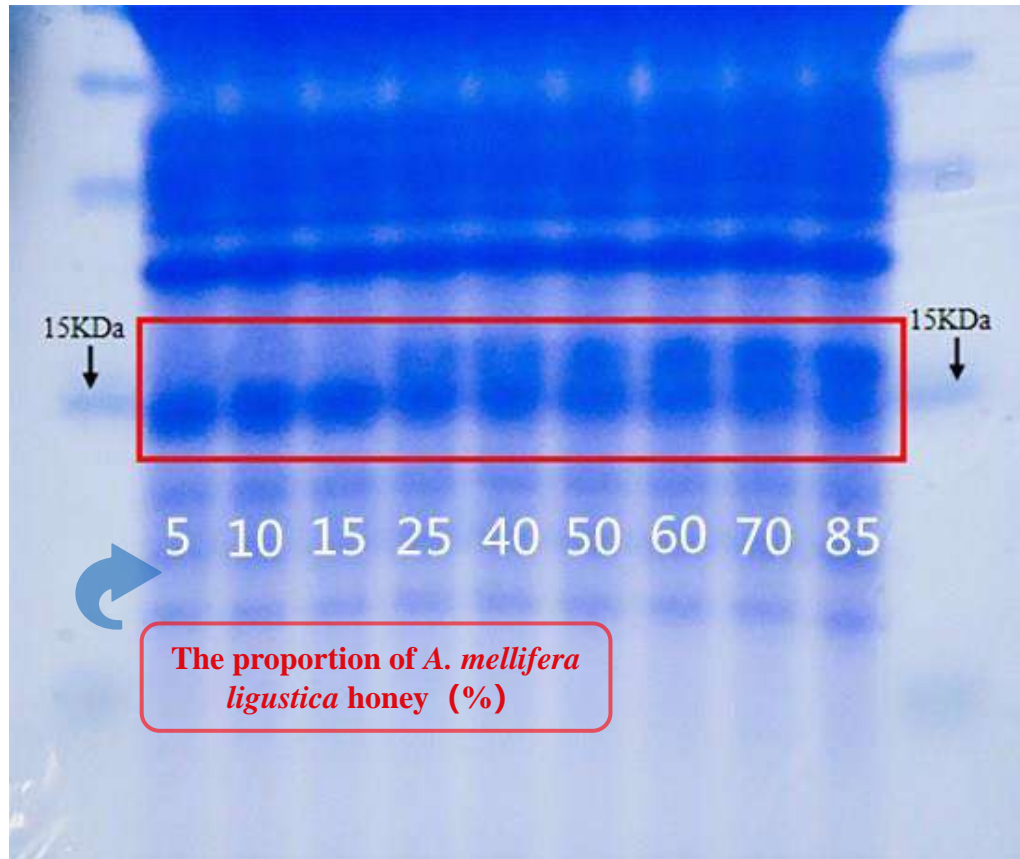


Fig 1. SDS-PAGE patterns of honey proteins of different entomological origin.  
Lane 1-4, *A. cerana cerana* honey. Lane 5-8, *A. mellifera ligustica* honey.

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**Fig 2. The protein pattern of *A. cerana cerana* honey mixed with *A. mellifera ligustica* honey**

**From left to right, the proportion of *A. mellifera ligustica* honey was 5%, 10%, 15%, 25%, 40%, 50%, 60%, 70%, 85 %.**

➤ **ELISA kit**



**Based on major royal  
jelly protein 2**

**1%**

**45 mins**

**Fig 3. The commercial ELISA kit for discrimination of *A. cerana cerana* honey and *A. mellifera ligustica* honey.**



## Results



**Table 2. Concentration of water-soluble protein in commercial *A. cerana cerana* honey samples**

Number	Concentration ( $\mu\text{g/g}$ )	Number	Concentration ( $\mu\text{g/g}$ )	Number	Concentration ( $\mu\text{g/g}$ )	Number	Concentration ( $\mu\text{g/g}$ )
1	433.81	22	435.48	43	1375.48	FN1	892.14
2	291.03	23	1129.92	44	647.14	FN2	652.14
3	332.14	24	601.03	45	975.48	FN3	947.7
4	392.14	25	1229.92	46	723.81	FN4	711.59
5	422.7	26	602.14	47	1175.48	FN5	769.92
6	834.37	27	841.03	48	563.81	FN6	1563.81
7	424.92	28	1154.92	49	572.7	FN7	972.14
8	848.81	29	888.81	50	1206.03	FN8	917.14
9	998.81	30	612.7	51	921.59	FN9	1268.81
10	899.92	31	296.59	52	978.26	FN10	1062.14
11	351.59	32	788.26	53	353.26	FN11	1011.03
12	483.26	33	1038.26	54	1264.92	FN12	1061.03
13	484.92	34	1161.03	55	799.92	FN13	976.03
14	607.14	35	978.81	56	619.92	FN14	867.14
15	608.81	36	699.92	57	603.26	FN15	0
16	700.48	37	1141.59	58	899.37	FN16	944.37
17	998.26	38	839.37	59	1018.26	FN17	753.81
18	876.59	39	116.03	60	810.48	FN18	886.03
19	826.03	40	1059.37	61	854.92	<i>A. cerana cerana</i> honey	406.03
20	647.14	41	1434.37	62	666.59	<i>A. mellifera ligustica</i> honey	887.14
21	1030.48	42	562.7	63	1084.92		

➤ SDS-PAGE test results

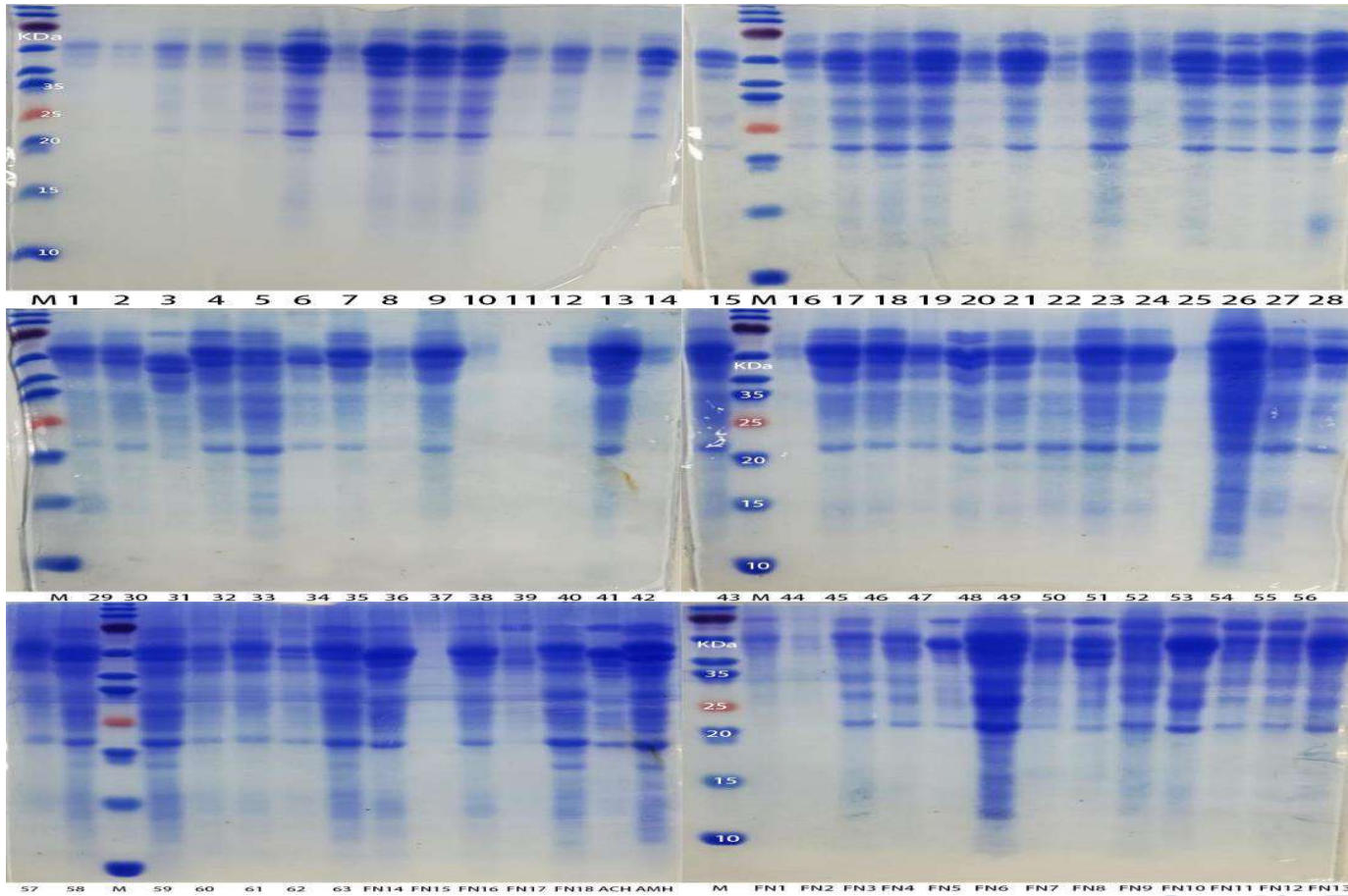


Fig 4. SDS-PAGE patterns of 81 commercial *A. cerana cerana* honey samples.

**Table 3. SDS-PAGE test results**

Number	<b>1</b>	<b>2</b>	3	4	5	6	<b>7</b>	8	9	10	<b>11</b>	12
<i>A. cerana cerana</i> honey	?	?	-	-	-	-	?	-	-	-	?	-
<i>A. mellifera ligustica</i> honey	?	?	+	+	+	+	?	+	+	+	?	+
Number	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>
<i>A. cerana cerana</i> honey	-	-	-	-	-	-	-	?	-	?	-	?
<i>A. mellifera ligustica</i> honey	+	+	+	+	+	+	+	?	+	?	+	?
Number	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>	<b>32</b>	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>
<i>A. cerana cerana</i> honey	-	-	-	-	-	-	+	-	-	-	-	?
<i>A. mellifera ligustica</i> honey	+	+	+	+	+	+	-	+	+	+	+	?
Number	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>
<i>A. cerana cerana</i> honey	-	-	-	?	-	?	-	?	-	-	-	-
<i>A. mellifera ligustica</i> honey	+	+	-	?	+	?	+	?	+	+	+	+
Number	<b>49</b>	<b>50</b>	<b>51</b>	<b>52</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>57</b>	<b>58</b>	<b>59</b>	<b>60</b>
<i>A. cerana cerana</i> honey	-	-	-	?	-	-	-	-	-	-	-	-
<i>A. mellifera ligustica</i> honey	+	+	+	?	-	+	+	+	+	+	+	+
Number	<b>61</b>	<b>62</b>	<b>63</b>	<b>FN1</b>	<b>FN2</b>	<b>FN3</b>	<b>FN4</b>	<b>FN5</b>	<b>FN6</b>	<b>FN7</b>	<b>FN8</b>	<b>FN9</b>
<i>A. cerana cerana</i> honey	-	-	-	?	?	-	+	+	-	+	+	-
<i>A. mellifera ligustica</i> honey	+	+	+	?	?	+	-	-	+	-	-	+
Number	<b>FN10</b>	<b>FN11</b>	<b>FN12</b>	<b>FN13</b>	<b>FN14</b>	<b>FN15</b>	<b>FN16</b>	<b>FN17</b>	<b>FN18</b>			
<i>A. cerana cerana</i> honey	+	-	-	+	+	-	+	+	-			
<i>A. mellifera ligustica</i> honey	-	+	+	-	-	-	-	-	+			

***A. cerana cerana* honey: 10, *A. mellifera ligustica* honey: 54, Unidentifiable: 17**

➤ ELISA kit test results

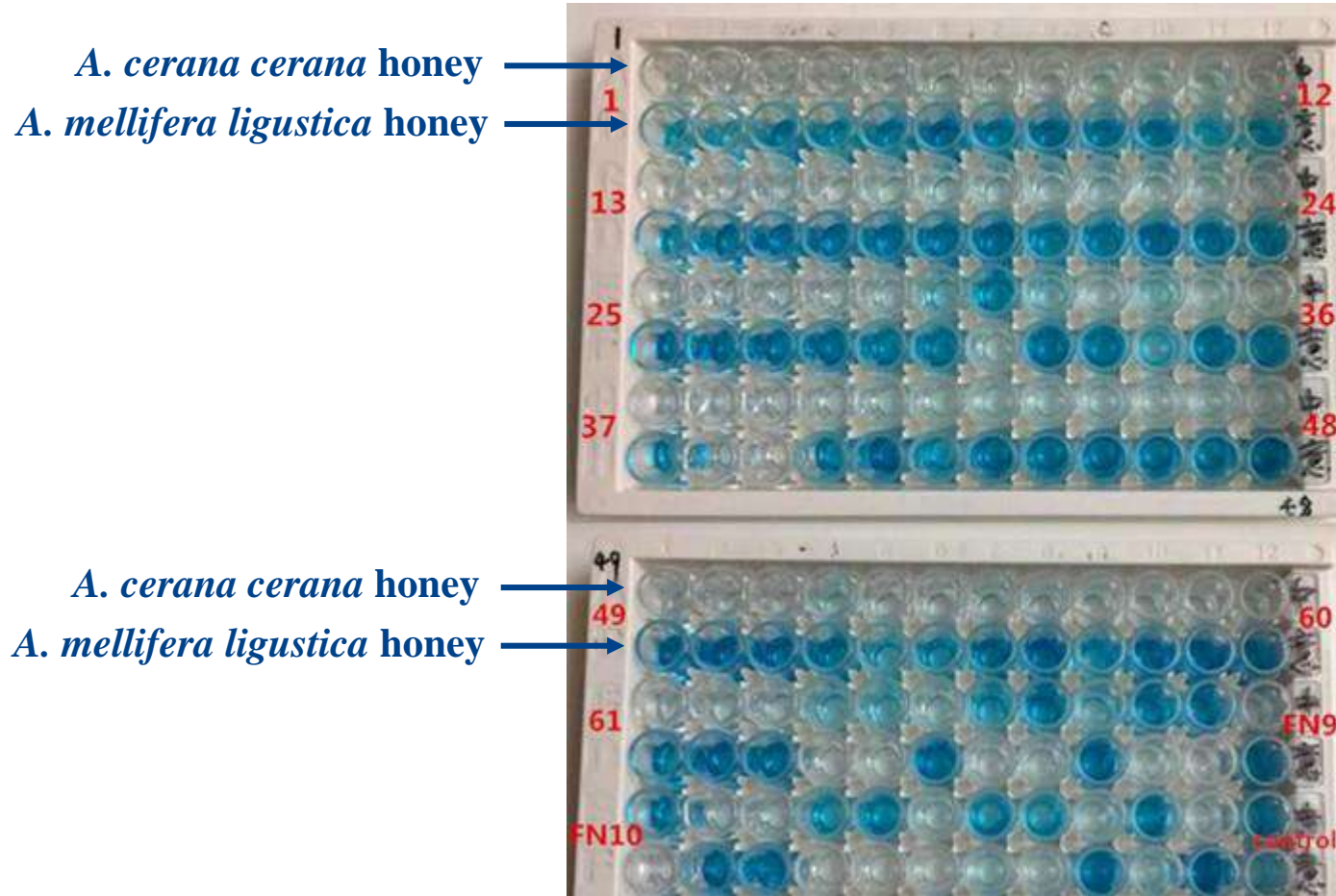


Fig 5. ELISA kit test results of 81 commercial *A. cerana cerana* honey samples.

**Table 4. ELISA kit test results**

Number	1	2	3	4	5	6	7	8	9	10	11	12
<i>A. cerana cerana</i> honey	-	-	-	-	-	-	-	-	-	-	-	-
<i>A. mellifera ligustica</i> honey	+	+	+	+	+	+	+	+	+	+	+	+
Number	13	14	15	16	17	18	19	20	21	22	23	24
<i>A. cerana cerana</i> honey	-	-	-	-	-	-	-	-	-	-	-	-
<i>A. mellifera ligustica</i> honey	+	+	+	+	+	+	+	+	+	+	+	+
Number	25	26	27	28	29	30	31	32	33	34	35	36
<i>A. cerana cerana</i> honey	-	-	-	-	-	-	+	-	-	-	-	-
<i>A. mellifera ligustica</i> honey	+	+	+	+	+	+	-	+	+	+	+	+
Number	37	38	39	40	41	42	43	44	45	46	47	48
<i>A. cerana cerana</i> honey	-	-	-	-	-	-	-	-	-	-	-	-
<i>A. mellifera ligustica</i> honey	+	+	-	+	+	+	+	+	+	+	+	+
Number	49	50	51	52	53	54	55	56	57	58	59	60
<i>A. cerana cerana</i> honey	-	-	-	-	-	-	-	-	-	-	-	-
<i>A. mellifera ligustica</i> honey	+	+	+	+	+	+	+	+	+	+	+	+
Number	61	62	63	FN1	FN2	FN3	FN4	FN5	FN6	FN7	FN8	FN9
<i>A. cerana cerana</i> honey	-	-	-	+	+	-	+	+	-	+	+	-
<i>A. mellifera ligustica</i> honey	+	+	+	-	-	+	-	-	+	-	-	+
Number	B10	B11	B12	B13	B14	FN15	FN16	FN17	FN18			
<i>A. cerana cerana</i> honey	+	-	-	+	+	-	+	+	-			
<i>A. mellifera ligustica</i> honey	-	+	+	-	-	-	-	-	+			

***A. cerana cerana* honey: 12, *A. mellifera ligustica* honey: 67, Unidentifiable: 2**





# Conclusions



# Conclusions

- The results of the SDS-PAGE method and ELISA kit were consistent and the authenticity of commercial *A. cerana cerana* honey we bought was 15% (12/81).
- No sample of *A. mellifera ligustica* honey mixed with *A. cerana cerana* honey was found.





**Thanks for the financial support  
for the trip by Wuhan Baochun  
royal jelly co., Ltd.**

*Thanks*

