Journal of Zhejiang University-SCIENCE B

Cite this as: Li-rong Shen, Yi-ran Wang, Liang Zhai, Wen-xiu Zhou, Liang-liang Tan, Mei-lu Li, Dan-dan Liu, Fa Xiao , 2015. Determination of royal jelly freshness by ELISA with a highly specific anti-apalbumin 1, major royal jelly protein 1 antibody. *Journal of Zhejiang University-Science B (Biomedicine & Biotechnology)*, 16(2):155-166. [doi:10.1631/jzus.B1400223]

Determination of royal jelly freshness by ELISA with a highly specific anti-apalbumin 1, major royal jelly protein 1 antibody

Key words:

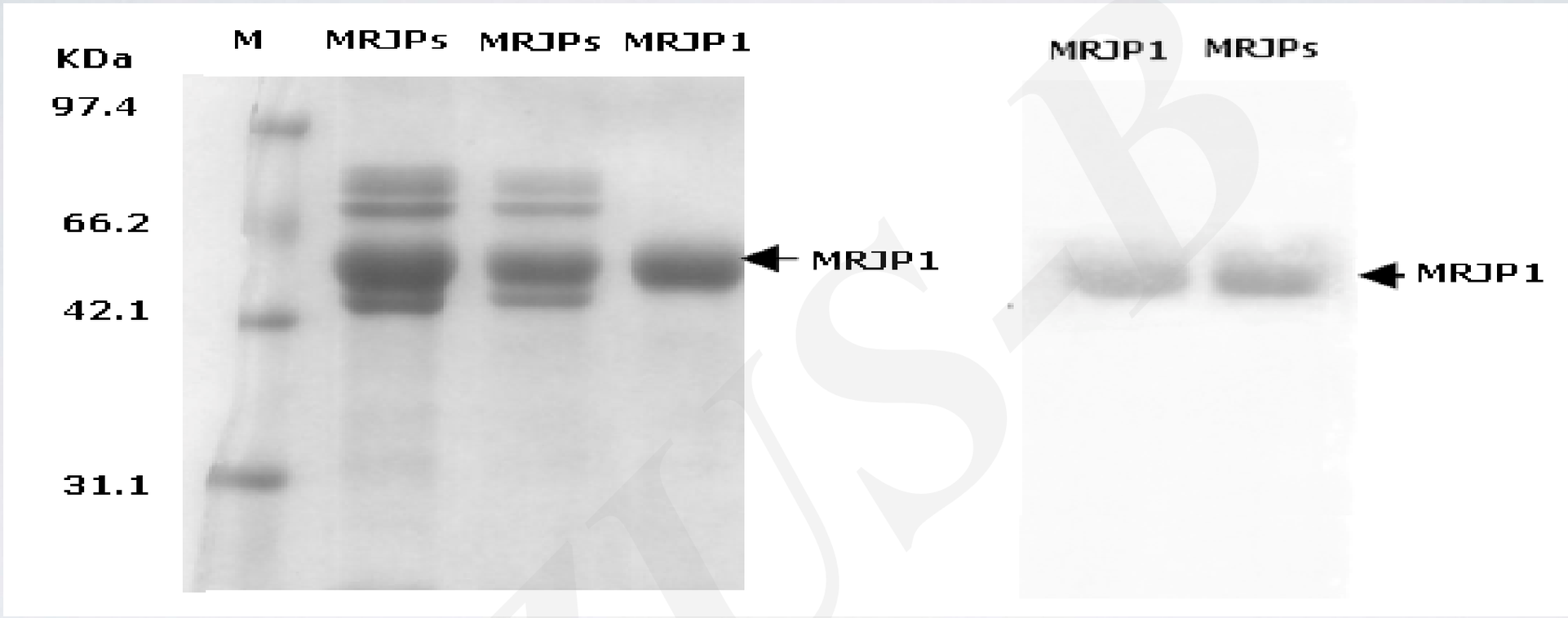
Freshness, Royal jelly, MRJP1, ELISA,
High specific antibody

Research Summary

Major royal jelly protein 1 (MRJP1) has been regarded as a freshness marker of royal jelly (RJ). A MRJP1-specific peptide (IKEALPHVPIFD) identified by bioinformatics analysis of homologous members of the major royal protein family was synthesized and used to raise polyclonal anti-specific MRJP1 antibody (anti-SP-MRJP1 antibody) . ELISA using the antibody to detect freshness of RJ was established .

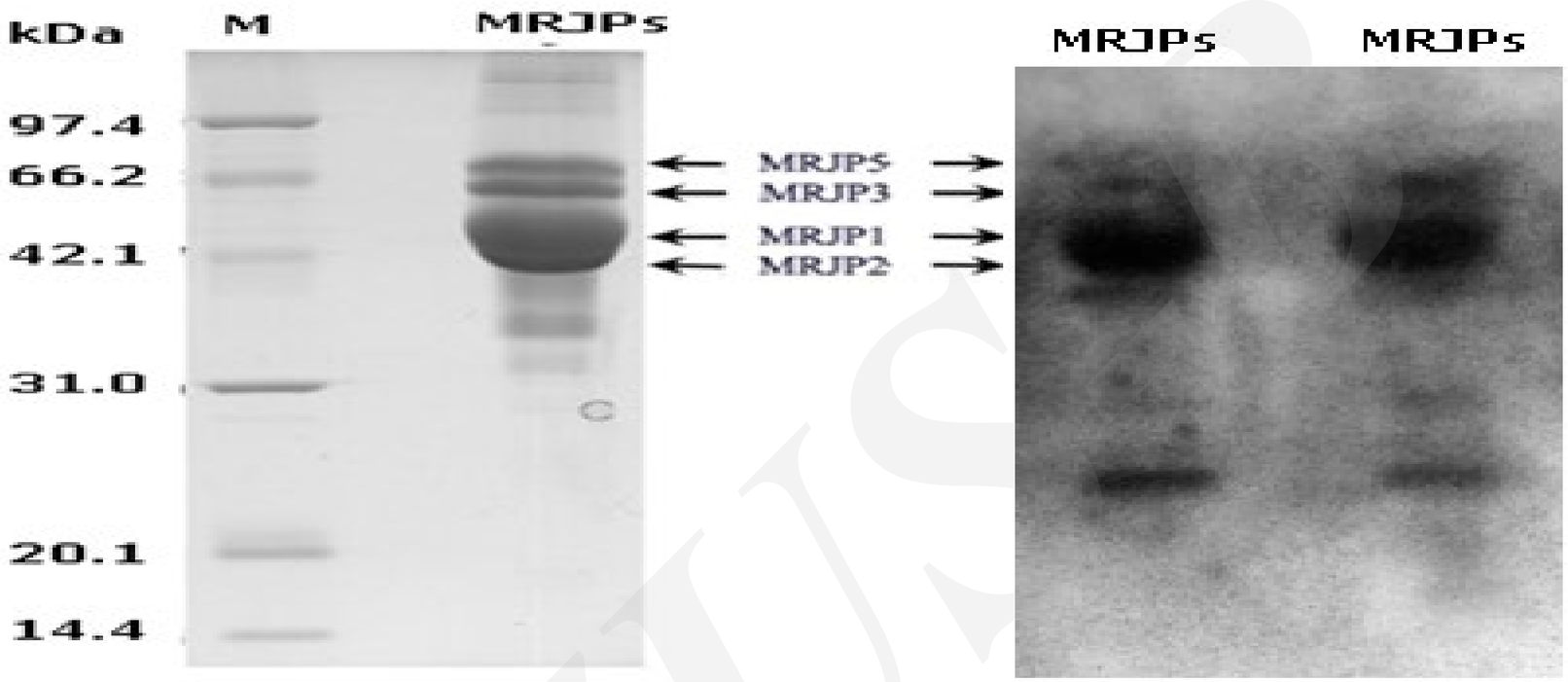
- The anti-SP-MRJP1 antibody binds specifically to MRJP1 only in RJ
- The anti-SP-MRJP1 antibody has a four-times higher binding activity than anti-recombinant MRJP1 antibody.

Innovation points



MRJP1 isolated from fresh RJ by ultracentrifugation and antibody affinity showed that one protein band of about 57 kDa. In Western blot assay, anti-SP-MRJP1 antibody recognized MRJP1 only in RJ .

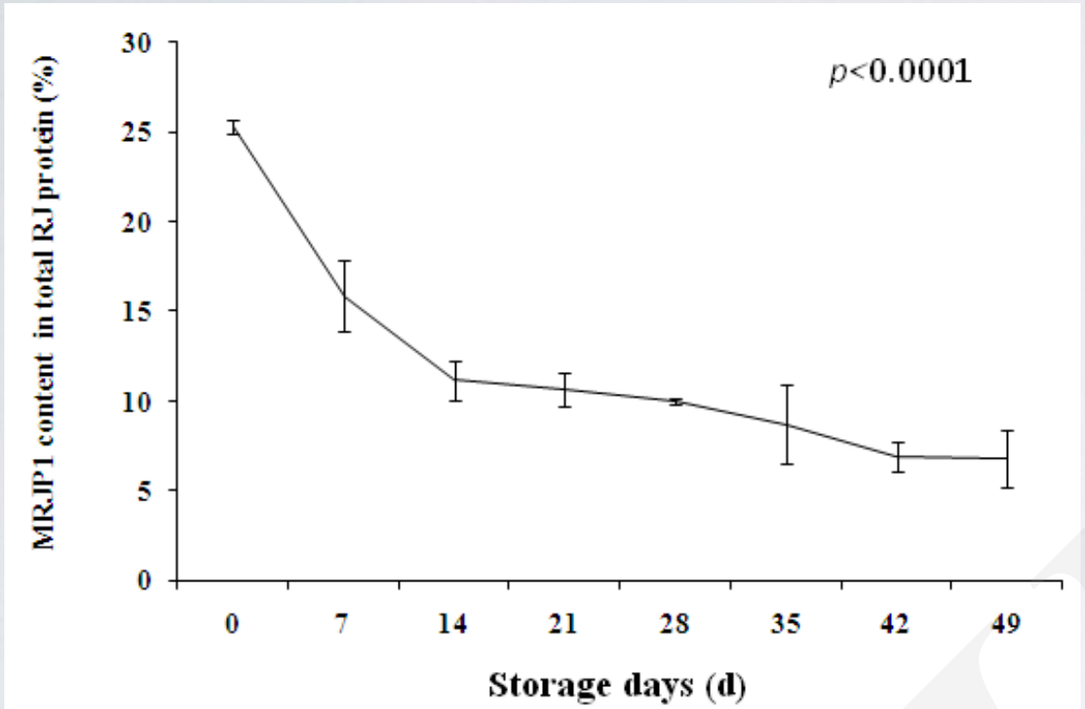
Innovation points



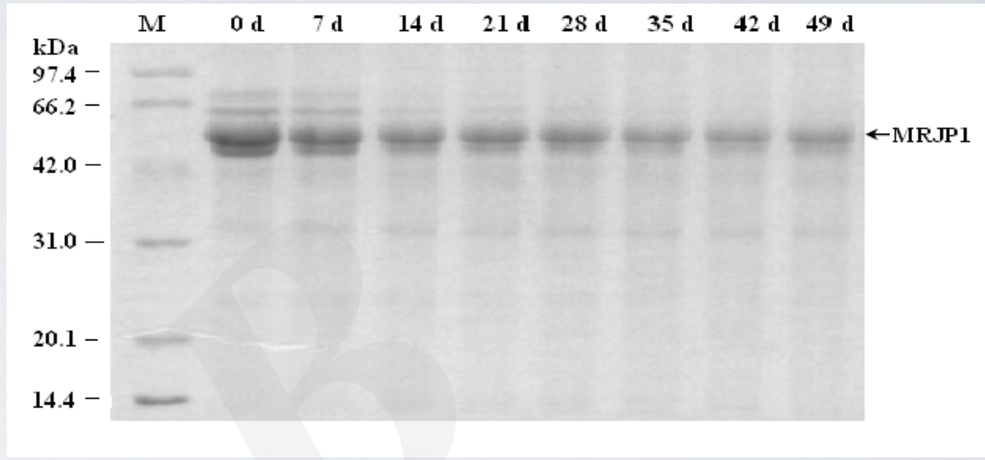
In Western blot assay, anti-recombinant-MRJP1 antibody reacted across with almost all members of the MRJP family

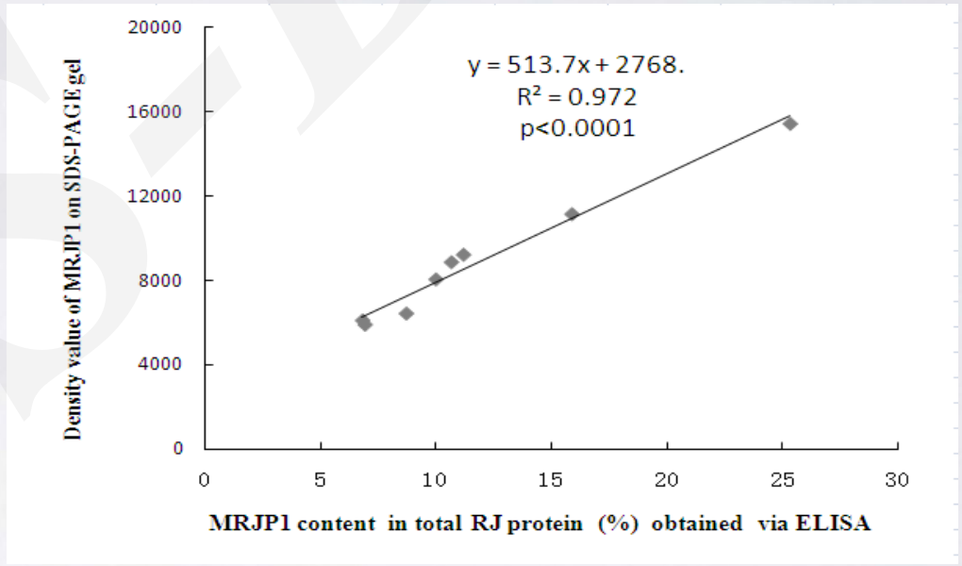
Figure 4

Innovation points



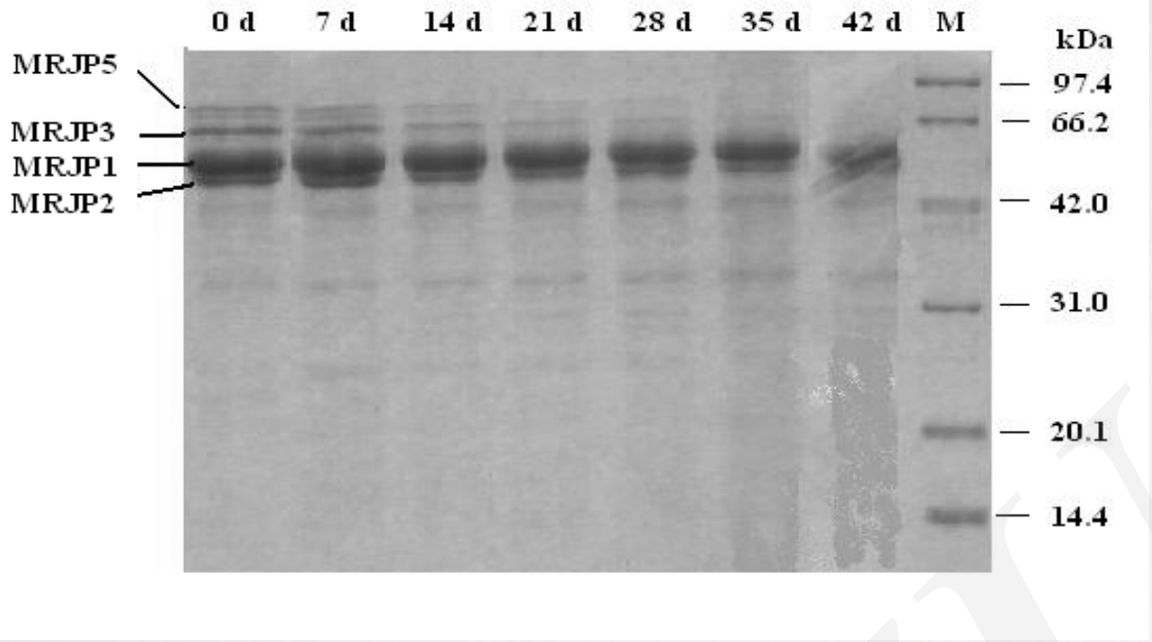
ELISA assay using anti-SP-MRJP1 antibody showed that MRJP1 content of the total protein of RJ stored at 40 ℃ for 7d, 14d, 21d, 28d, 35d, 42d and 49d decreased by 37.3%, 55.9%, 58.0%, 60.6%, 65.7%, 72.7% and 73.1% , respectively , relative to the MRJP1 content of the fresh RJ at 0 d

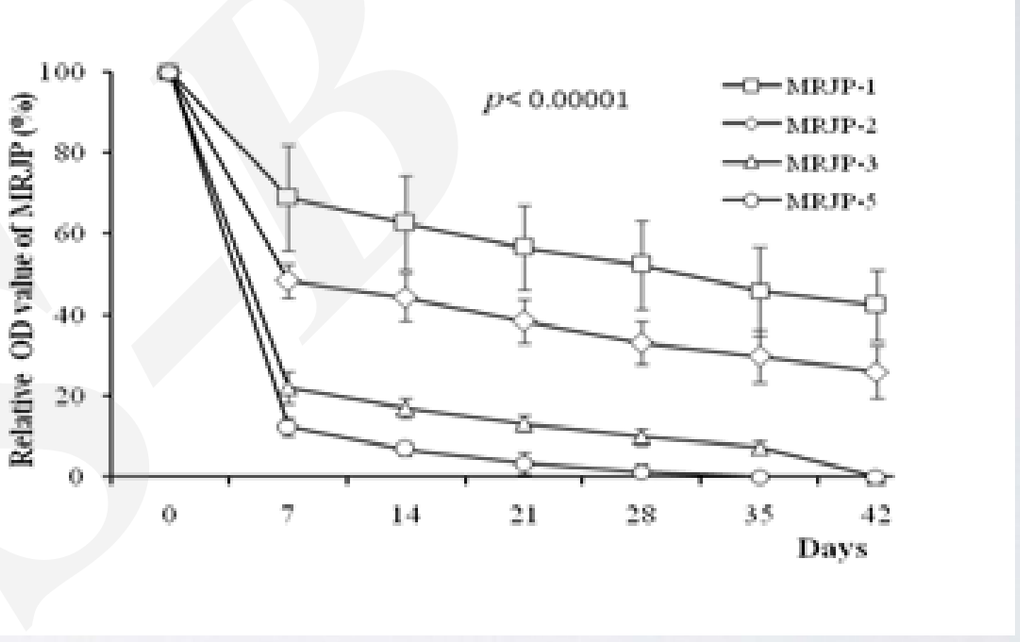




MRJP1 in the total protein of RJ ranging from 5% to 30% was strongly and positively correlated with the density values of MRJP1 bands on the SDS-PAGE gel of RJ (R^2=0.972, P<0.0001).

Innovation points





Overall the key MRJP proteins-MRJP1, MRJP2, MRJP3 and MRJP5 -in RJ stored at 40 ℃ from 7 d to 42 d, degraded consistently when compared with those of the fresh RJ (0 d).

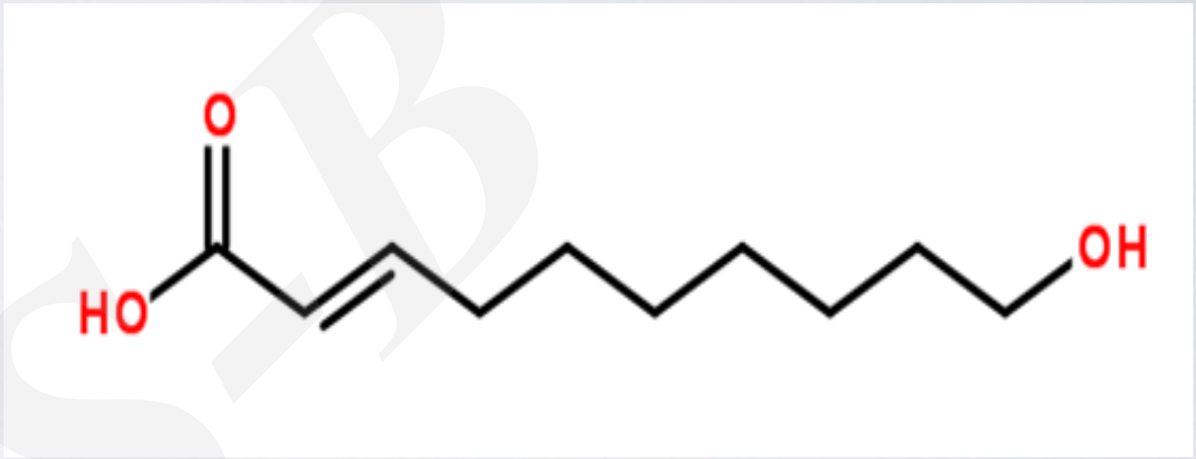
Prospection

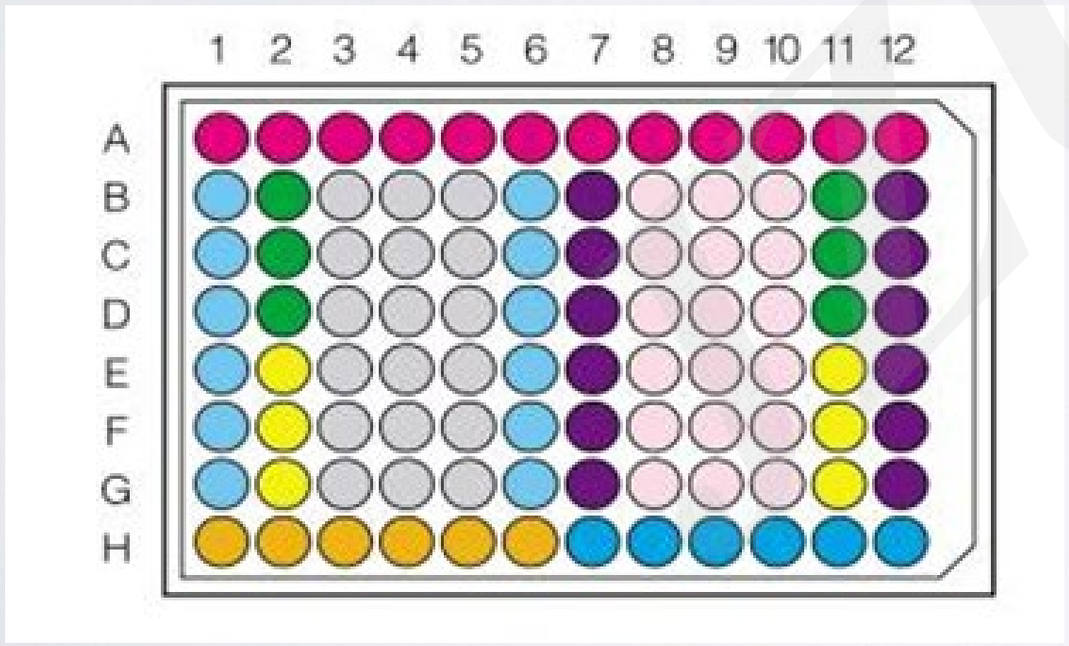
Because of its great potential benefits to human health, RJ is widely used as a key component in many commercial products including medicine, dietary supplements, and cosmetics.

However, RJ may spoil and lose its biological activities depending on storage duration and temperature. In order to preserve its biological properties, RJ has to be stored under freezing conditions. It is essential to measure RJ freshness to ensure its quality for trade.

Prospection

Currently, 10-hydroxy-2-decenoic acid (10-HDA) has been used as the typical quality criterion of RJ. As no correlation between 10-HDA content and storage duration was found, new criteria to measure the freshness in the duration of RJ storage are needed.





As anti-SP-MRJP antibody was highly specific for MRJP1, and ELISA using the antibody is a sensitive and easy-to-use method to determine the freshness and authenticity of RJ.