

Abstract

The edible tissue ratio, proximate, fatty acid, and free amino acid compositions were examined and compared among Chinese mitten crabs (*Eriocheir sinensis*) samples from Ya Lake over different months. Regardless of gender, the gonad index (GSI) in May and June was significantly higher than in August and September ($P < 0.05$), whereas the hepatopancreas index (HSI), meat yield (MY), and total edible rate (TEY) were higher in August and September. For proximate composition, regardless of gender, the total lipid content in the hepatopancreas in September was significantly higher than other months, and the total lipid and protein content in the gonads was the highest. Furthermore, the content of EPA in female hepatopancreas was the highest in August. Regardless of sex, C16:1n7 in muscle in September was significantly higher than in other months ($P < 0.05$), and the ratio of n-3/n-6 PUFA was the highest. Moreover, females had the highest glutamate and arginine content in their ovaries in August ($P < 0.05$). Among the muscles, both sexes in September contained higher levels of alanine and glutamate. Thus, the edible tissue ratio, nutritional quality, and taste of Ya Lake *E. sinensis* in September were the best.

Introduction

- Chinese mitten crab (*Eriocheir sinensis*) is one of the most important economic crabs of the aquaculture industry in China (Chen and Jiang, 2009).
- The market time of *E. sinensis* in China is usually concentrated in mid-October to the end of November (Cheng et al., 2016).
- Because the time-to-market of *E. sinensis* is too concentrated, the competition in the crab sales market is excessive, which hinders the healthy and sustainable development of the *E. sinensis* industry.
- Compared with the Yangtze *E. sinensis*, numerous adult crabs of Ya Lake can be for sale in advance, which is important for leveraging local advantages to improve economic benefits and achieving monthly sales of adult crabs.
- It has not been reported whether the edibility rate and quality of *E. sinensis* are different over different months.
- We investigated the edible tissues, nutritional quality, and flavor substances of adult crabs from May to September from the Ya Lake.
- The results can provide scientific basis and reference for quality control and fishing and marketing of Ya Lake *E. sinensis* and provide basic data for developing the *E. sinensis* industry.

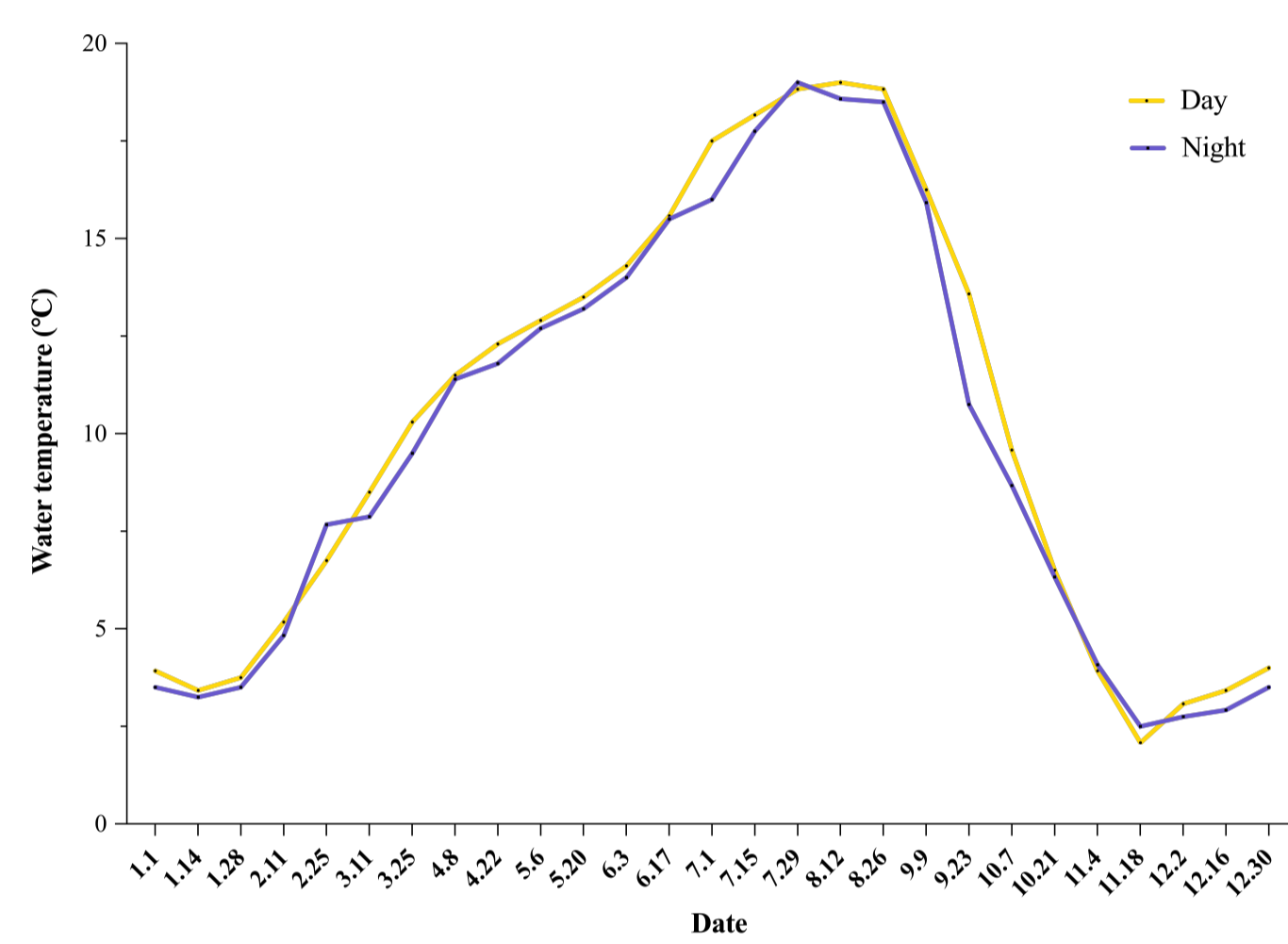


Fig. 1. The change of water temperature in the Ya Lake throughout the year.

Materials and Methods

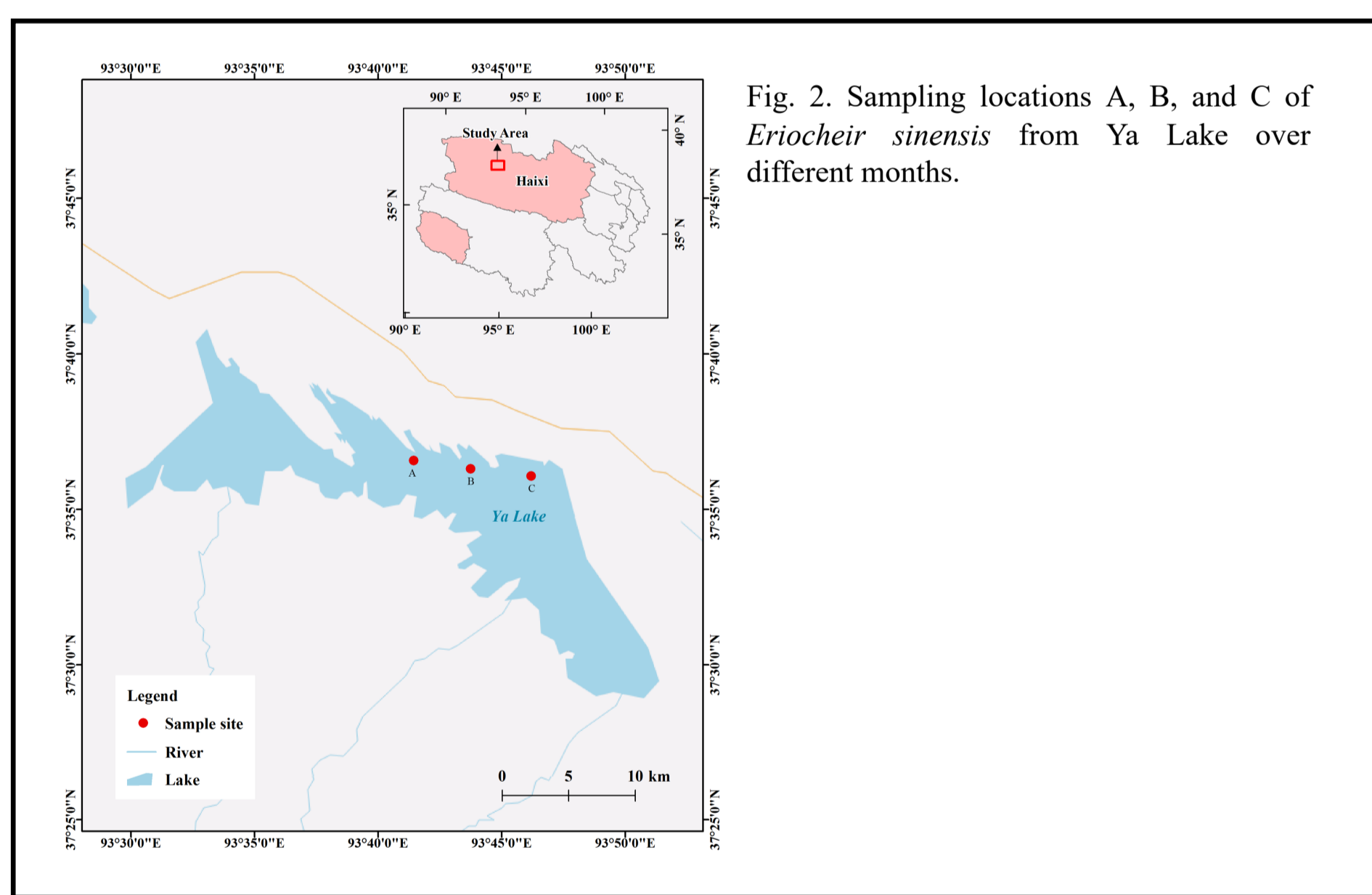
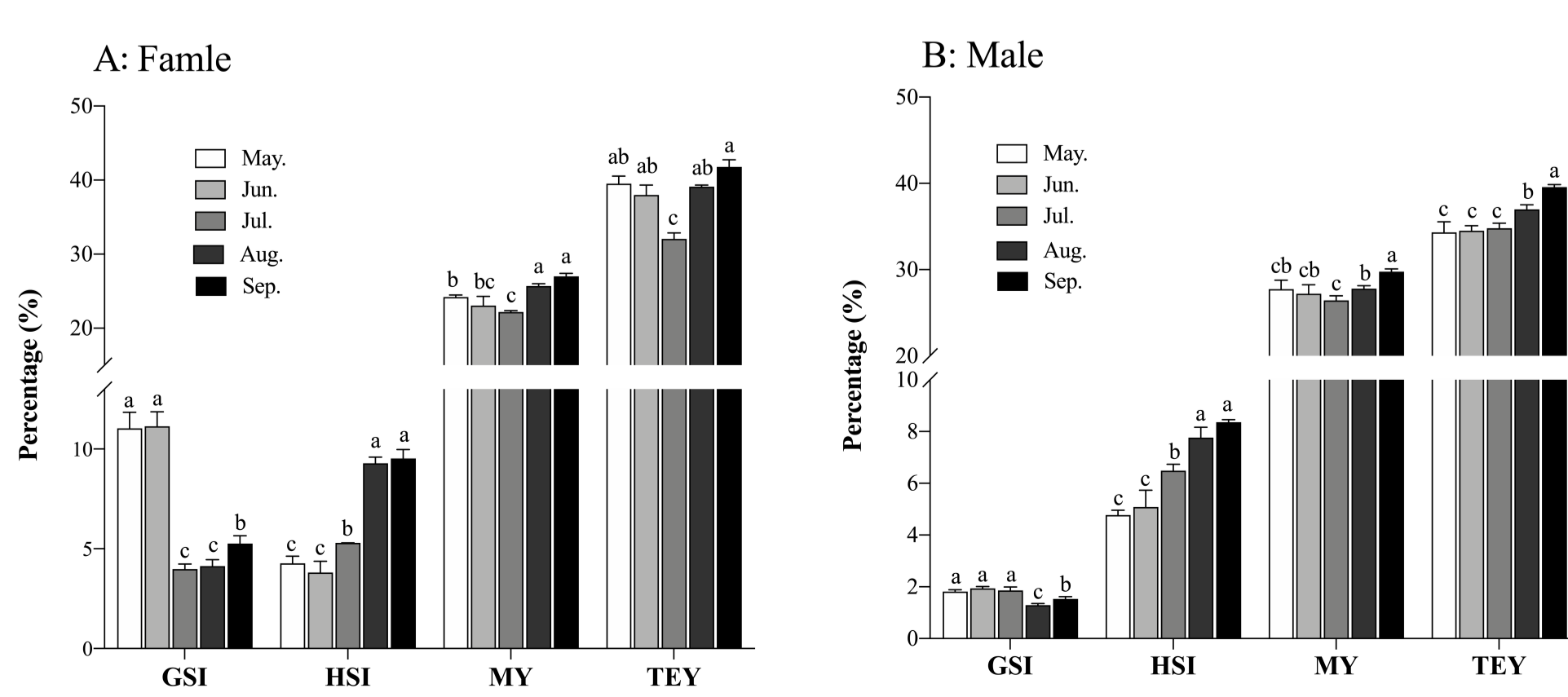


Fig. 2. Sampling locations A, B, and C of *Eriocheir sinensis* from Ya Lake over different months.

- The experimental mature *E. sinensis* were collected from the Qinghai Ya Lake and were sampled from three points in the lake every month from May to September. At each point, 10 male and 10 female crabs with similar physical condition and size were randomly selected.
- The edible tissue ratio, proximate, fatty acid, and free amino acid compositions were examined.

Results

Fig. 3. The total edible yield (%) of adult *E. sinensis* from Ya Lake over different months. HSI: hepatosomatic index; GSI: gonadosomatic index; MY: meat yield; TEY: total edible yield. A: Female; B: Male.



Results

Tab 1 The proximate composition in the hepatopancreas, gonads of adult *E. sinensis* from Ya Lake in different months (% wet weight).

Item	Female					Male				
	May	June	July	August	September	May	June	July	August	September
Hepatopancreas										
Moisture	58.55±1.44 ^b	61.24±1.30 ^{ab}	63.30±0.32 ^a	54.16±0.47 ^c	46.75±0.31 ^d	69.08±0.59 ^a	64.86±1.52 ^b	62.68±0.32 ^c	49.09±0.81 ^d	45.98±0.48 ^e
Protein	9.78±0.50 ^a	9.45±0.05 ^a	7.99±0.34 ^b	6.29±0.26 ^c	7.91±0.32 ^b	10.27±0.12 ^a	9.14±0.59 ^b	7.25±0.28 ^c	6.48±0.10 ^c	6.59±0.26 ^c
Lipid	25.78±1.70 ^c	27.52±0.78 ^c	20.73±0.38 ^d	33.75±0.36 ^b	42.40±0.31 ^a	15.01±0.74 ^e	22.87±0.64 ^d	25.28±0.58 ^c	39.66±0.41 ^b	45.09±0.50 ^a
Ash	1.12±0.04 ^e	1.86±0.09 ^a	1.81±0.03 ^a	1.69±0.07 ^a	1.40±0.11 ^b	2.11±0.16 ^a	2.26±0.05 ^a	2.28±0.05 ^a	1.39±0.08 ^b	1.17±0.05 ^b
Gonads										
Moisture	57.75±0.53 ^c	56.46±0.51 ^c	66.44±0.74 ^a	60.35±1.46 ^b	54.61±0.40 ^d	76.36±0.48	76.66±0.59	77.03±0.93	77.30±0.48	75.64±0.36
Protein	24.75±0.41 ^e	26.72±0.16 ^b	18.69±0.55 ^d	25.04±0.63 ^c	29.74±0.28 ^a	15.34±0.35	15.32±0.32	15.63±0.74	15.28±0.34	16.48±0.28
Lipid	13.93±0.15 ^a	13.82±0.35 ^a	10.63±0.19 ^b	11.15±0.61 ^b	14.29±0.26 ^a	1.04±0.05 ^a	0.78±0.01 ^b	0.62±0.02 ^c	1.02±0.05 ^a	1.00±0.06 ^a
Ash	1.66±0.09 ^{ab}	1.57±0.06 ^b	1.47±0.05 ^b	1.86±0.06 ^a	1.82±0.06 ^a	1.44±0.02 ^{ab}	1.19±0.05 ^c	1.43±0.05 ^{ab}	1.27±0.15 ^{bc}	1.59±0.05 ^a

Fig. 4. The content of linoleic acid(LA), eicosapentenoic acid(EPA) and docosahexenoic acid(DHA) in the hepatopancreas of adult *Eriocheir sinensis* from Ya Lake over different months (% of total fatty acids). A: Female; B: Male.

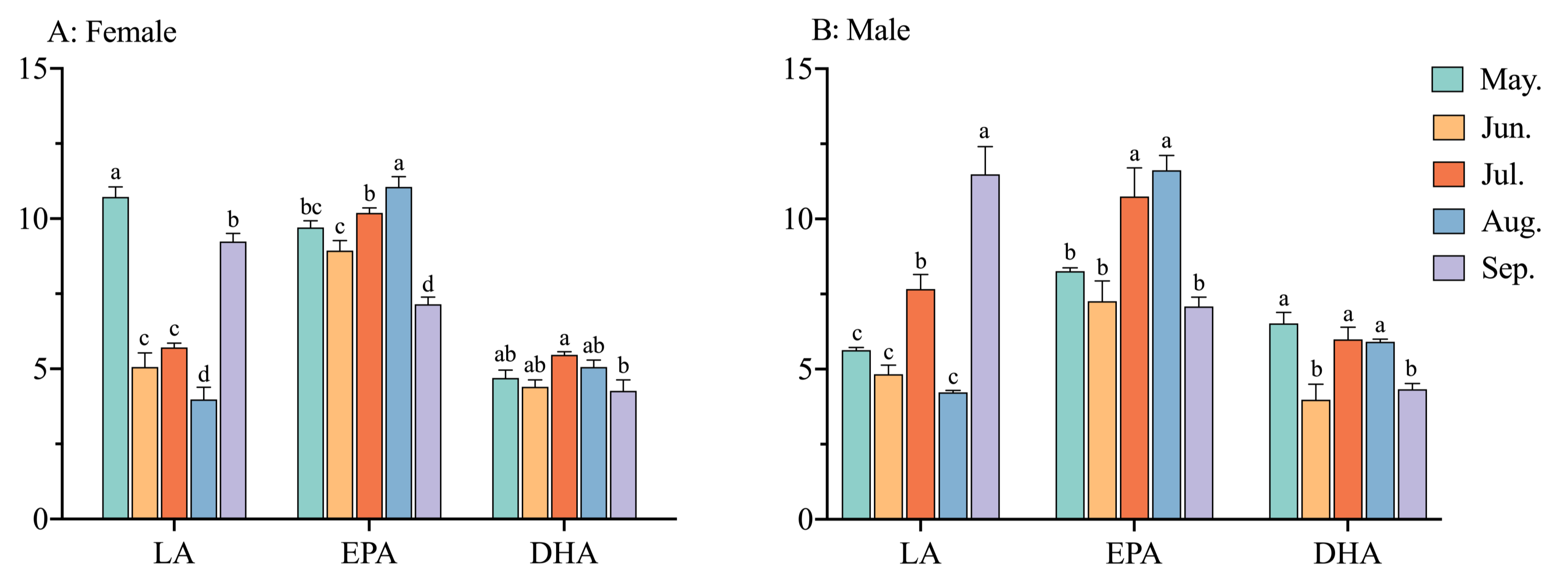


Fig. 5. The taste activity of free amino acid compositions of adult *E. sinensis* gonads from YaLake over different months. A: Female; B: Male.

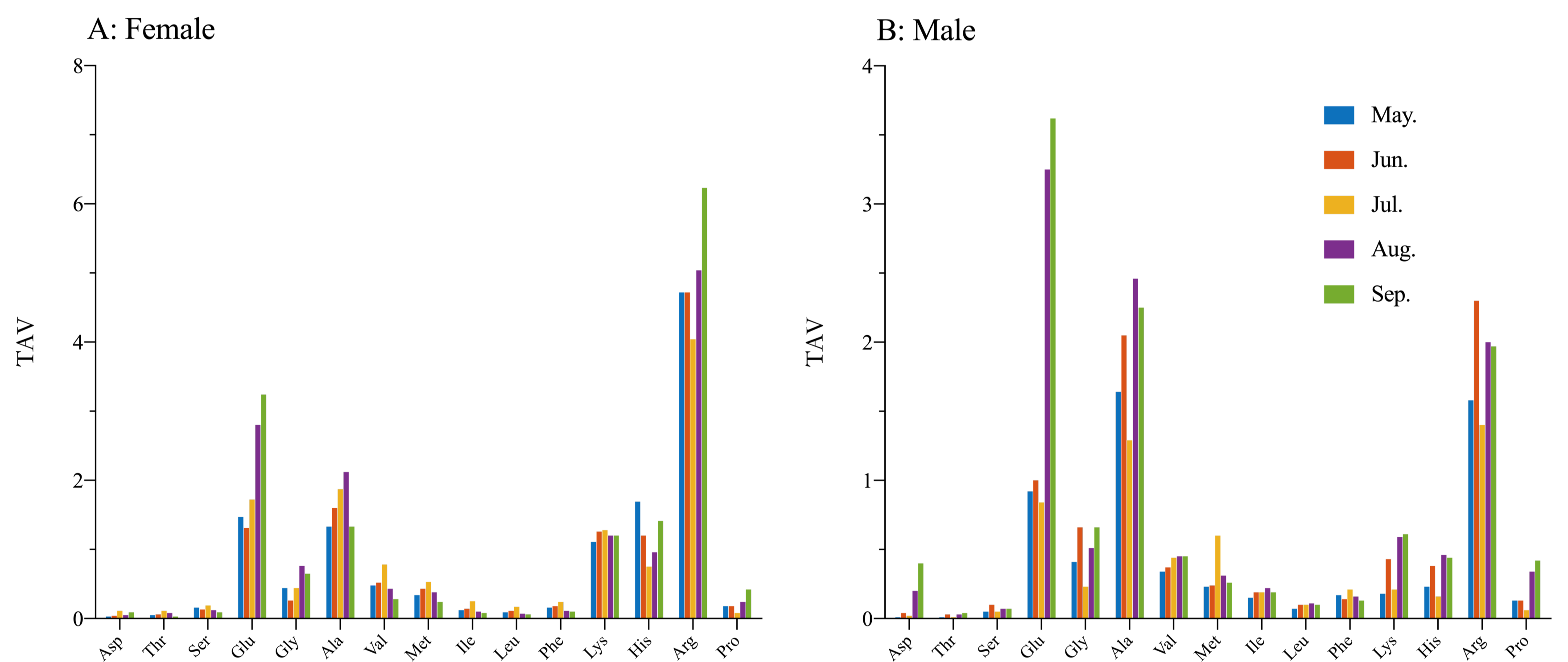
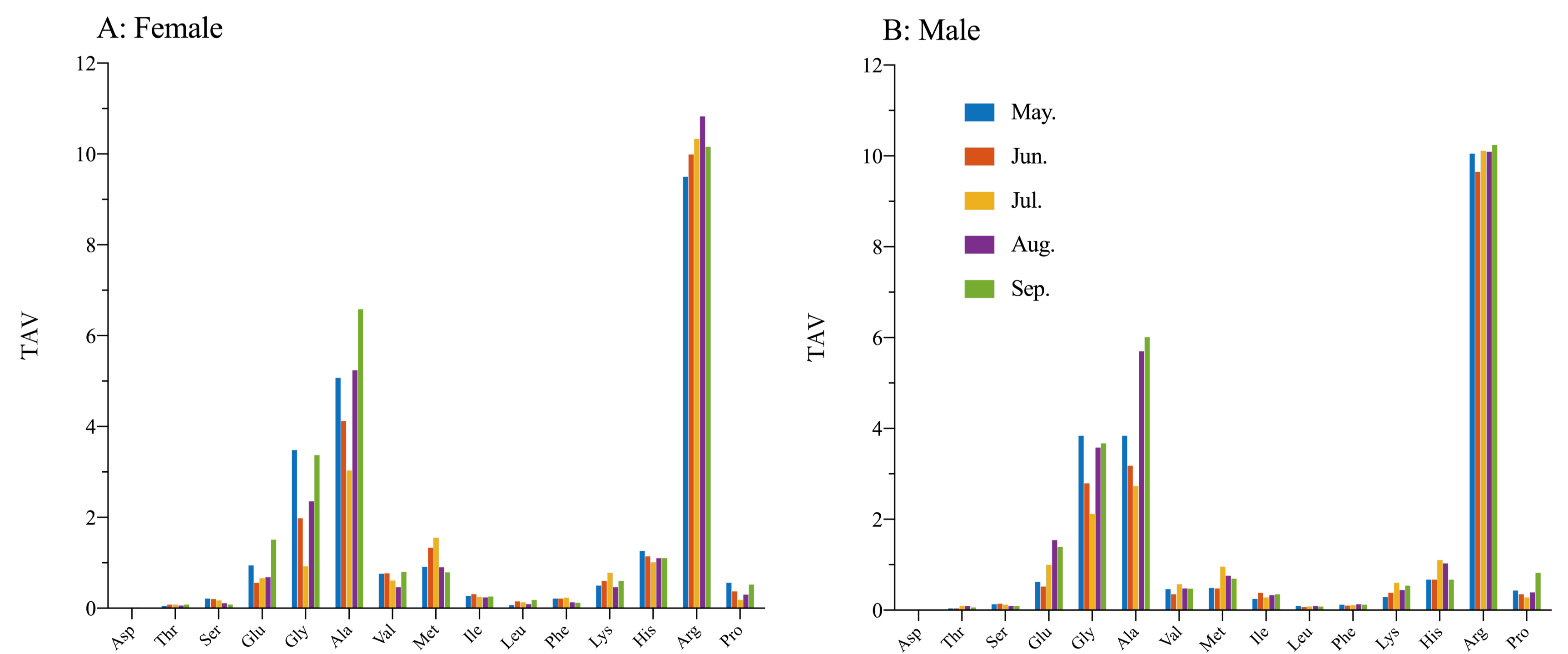


Fig. 6. The taste activity of free amino acid compositions of adult *E. sinensis* muscles from YaLake over different months. A: Female; B: Male.



Conclusions

- It was confirmed that the crabs in September had higher HSI, MY, and TEY; and the highest total lipid content in the gonads and hepatopancreas.
- The sweet and umami amino acids content in edible tissues is higher in August and September.
- Considering the nutrition and flavor quality of the edible tissues of *E. sinensis*, crabs in September have a higher nutritional quality and the best taste.

References

- Chen, S.S., Jiang, G.D., (2009). Volatile Flavor Components in Meat of Chinese Mitten Crab (*Eriocheir sinensis*). Food science, 30(20), 308-311.
- Cheng, Y.X., Wu, X.G., He, J., Liu, Q., (2016). Progress in the selection and breeding of the second-year early-maturing and late-maturity strains of Chinese mitten crab (*Eriocheir sinensis*). Scientific Fish Farming, 5, 15-17.