## Supplementary Materials

**Table S1. The sequence length of all samples**

| Samples of chilling storage | Sequences | Samples of supercooling storage | Sequences | Samples of superchilling storage | Sequences | Samples of sub-freezing storage | Sequences |
|-----------------------------|-----------|---------------------------------|-----------|----------------------------------|-----------|---------------------------------|-----------|
| A1_1d                       | 54479     | B1_1d                           | 46644     | C1_1d                            | 44695     | D1_1d                           | 54195     |
| A2_1d                       | 59583     | B2_1d                           | 46942     | C2_1d                            | 54645     | D2_1d                           | 41773     |
| A3_1d                       | 50898     | B3_1d                           | 43296     | C3_1d                            | 45297     | D3_1d                           | 47504     |
| A4_1d                       | 49284     | B4_1d                           | 39566     | C4_1d                            | 47350     | D4_1d                           | 46189     |
| A5_1d                       | 52072     | B5_1d                           | 47863     | C5_1d                            | 35342     | D5_1d                           | 48209     |
| A6_1d                       | 47549     | B6_1d                           | 42902     | C6_1d                            | 41038     | D6_1d                           | 41035     |
| A1_7d                       | 50793     | B1_7d                           | 52995     | C1_7d                            | 50840     | D1_7d                           | 40948     |
| A2_7d                       | 47903     | B2_7d                           | 45946     | C2_7d                            | 43090     | D2_7d                           | 43617     |
| A3_7d                       | 47559     | B3_7d                           | 47355     | C3_7d                            | 47475     | D3_7d                           | 44243     |
| A4_7d                       | 48965     | B4_7d                           | 41792     | C4_7d                            | 45275     | D4_7d                           | 29783     |
| A5_7d                       | 43582     | B5_7d                           | 38713     | C5_7d                            | 45862     | D5_7d                           | 36011     |
| A6_7d                       | 46349     | B6_7d                           | 43487     | C6_7d                            | 50194     | D6_7d                           | 39403     |
| A1_14d                      | 45837     | B1_14d                          | 35427     | C1_14d                           | 51154     | D1_14d                          | 44527     |
| A2_14d                      | 59934     | B2_14d                          | 48727     | C2_14d                           | 40697     | D2_14d                          | 43615     |
| A3_14d                      | 45118     | B3_14d                          | 39186     | C3_14d                           | 38060     | D3_14d                          | 46507     |
| A4_14d                      | 41229     | B4_14d                          | 45199     | C4_14d                           | 34942     | D4_14d                          | 42908     |
| A5_14d                      | 42983     | B5_14d                          | 42750     | C5_14d                           | 38603     | D5_14d                          | 48040     |
| A6_14d                      | 40456     | B6_14d                          | 44437     | C6_14d                           | 39876     | D6_14d                          | 41897     |
| –                           | –        | B1_28d                          | 43867     | C1_28d                           | 43316     | D1_28d                          | 38311     |
| –                           | –        | B2_28d                          | 46994     | C2_28d                           | 52650     | D2_28d                          | 38747     |
| –                           | –        | B3_28d                          | 40909     | C3_28d                           | 57821     | D3_28d                          | 43290     |
| –                           | –        | B4_28d                          | 46064     | C4_28d                           | 39583     | D4_28d                          | 43950     |
| –                           | –        | B5_28d                          | 45585     | C5_28d                           | 47898     | D5_28d                          | 41682     |
| –                           | –        | B6_28d                          | 38378     | C6_28d                           | 47344     | D6_28d                          | 39328     |
Table S2. The coverage of all samples

| Treatment                | Chilling storage | Supercooling storage | Superchilling storage | Sub-freezing storage |
|--------------------------|------------------|----------------------|-----------------------|----------------------|
|                          | 1 d   | 7 d   | 14 d  | 28 d  | 1 d   | 7 d   | 14 d  | 28 d  | 1 d   | 7 d   | 14 d  | 28 d  |
| Coverage                 | 0.9927 | 0.99568 | 0.9996 | 0.99355 | 0.99362 | 0.99291 | 0.9991 | 0.99267 | 0.993 | 0.9929 | 0.9937 | 0.995 | 0.99138 | 0.99079 | 0.99293 |

Table S3. The change of sobs, chao and shannon index at day 1, day 14, and day 28

| Treatment | Chilling storage | Supercooling storage | Superchilling storage | Sub-freezing storage |
|-----------|------------------|----------------------|-----------------------|----------------------|
|           | 1 d   | 14 d  | 1 d   | 28 d  | 1 d   | 28 d  | 1 d   | 28 d  |
| Sobs      | 399.6±209.14 | 20.50±6.75 | 340.5±106.82 | 29.50±7.66 | 271.50±60.41 | 393.3±103.91 | 371.17±67.01 | 447.5±147.28 |
| Chao1     | 503.5±221.05 | 27.81±10.29 | 446.1±136.42 | 62.78±31.90 | 431.36±63.18 | 481.8±129.22 | 434.70±96.48 | 538.4±166.64 |
| Shannon   | 3.57±0.88  | 1.21±0.12  | 3.25±0.83   | 1.09±0.35   | 2.49±0.88   | 3.77±0.62   | 3.79±0.47   | 3.87±0.80   |