Supplementary Table 1 Skin care efficacy scores of different fermented formulas

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| **Strains** | **Fermentation Recipe** | **Residual moisture** | **Tyrosinase inhibition** | **Hydroxyl radical scavenging** | **Score** |
| YB14 | CX, HJT, Hh, HH, BZ | 60.61% | 82.75% | 0 | 49.06 |
| YB14 | CX, HJT, Hh, HH, BZ | 62.61% | 0 | 0 | 25.04 |
| YB14 | CX, HJT, Hh, BZ | 73.06% | 84.75% | 69.87% | 75.61 |
| YB14 | CX, HJT, Hh, BZ | 83.68% | 0 | 0 | 33.47 |
| YB14 | CX, Hh, HH, BZ | 60.48% | 84.50% | 0 | 49.54 |
| YB14 | HJT, Hh, HH, BZ | 86.37% | 25.00% | 0 | 42.04 |
| YB04 | BJ, HQ, JYH, Hh, BZ | 63.43% | 10.00% | 50.39% | 43.48 |
| YB04 | BJ, HQ, JYH, HH | 64.93% | 0 | 0 | 25.97 |
| YB04 | BJ, HQ, JYH, BZ | 64.58% | 0 | 50.13% | 40.86 |
| YB04 | BJ, JYH, HH,BZ | 85.92% | 0 | 20.37% | 40.47 |
| YB04 | HQ, JYH, HH, BZ | 87.06% | 14.25% | 35.51% | 49.75 |
| YB04 | BJ, HQ, HH, BZ | 85.06% | 14.50% | 50.13% | 53.41 |
| YB05 | BJ, HJT,HQ,JYH, HH, BZ | 65.64% | 0 | 76.50% | 49.20 |
| YB05 | BJ, HJT, HQ, HH,BZ | 69.61% | 20.50% | 0 | 33.99 |
| YB05 | BJ, HQ, JYH, HH, BZ | 66.75% | 0 | 31.33% | 36.10 |
| YB05 | HJT,HQ, JYH, HH,BZ | 84.70% | 80.25% | 0 | 57.95 |
| YB05 | BJ, HJT, JYH, HH,BZ | 60.25% | 0 | 0 | 24.10 |
| YB05 | BJ, HJT, HQ, JYH,BZ | 60.39% | 2.50% | 0 | 24.90 |
| YB05 | BJ, HJT, HQ, JYH, HH | 60.85% | 84.00% | 0 | 49.53 |
| YB07 | HJT, FPZ, JYH, BJ, BZ | 84.99% | 44.68% | 124.80% | 77.39 |
| YB07 | HJT, JYH, BJ, BZ | 93.56% | 0 | 63.71% | 56.53 |
| YB07 | HJT, FPZ, JYH, BJ | 82.29% | 63.33% | 82.66% | 76.71 |
| YB07 | HJT, FPZ, BJ, BZ | 87.38% | 51.50% | 92.17% | 78.05 |
| YB07 | FPZ, JYH, BJ, BZ | 39.50% | 13.30% | 79.11% | 43.52 |
| YB09 | CX, BJ, HJT, Hh, FPZ,BZ | 74.65% | 8.00% | 0 | 32.25 |
| YB09 | CX, BJ, HJT, FPZ,BZ | 81.85% | 0 | 0 | 32.74 |
| YB09 | CX, BJ, Hh, FPZ,BZ | 79.41% | 0 | 96.34% | 60.66 |
| YB09 | CX,BJ, HJT,Hh, BZ | 80.70% | 0 | 0 | 32.28 |
| YB09 | CX,BJ, HJT,Hh, FPZ | 88.11% | 246.75% | 0 | 65.24 |
| YB09 | BJ,HJT,Hh, FPZ,BZ | 68.57% | 174.25% | 0 | 57.42 |
| YB09 | CX, HJT, Hh, FPZ, BZ | 80.09% | 0 | 0 | 32.03 |
| YB08 | HJT, Hh, FPZ, JYH, BZ | 73.18% | 236.23% | 3.13% | 60.21 |
| YB08 | HJT, Hh, FPZ, BZ  | 61.79% | 0 | 2.35% | 25.42 |
| YB08 | HJT, Hh, JYH, BZ | 84.93% | 290.25% | 0 | 63.97 |
| YB08 | HJT, Hh, FPZ, JYH  | 64.02% | 0 | 0 | 25.60 |
| YB08 | Hh, FPZ, JYH, BZ  | 90.51% | 6.50% | 0 | 38.15 |
| YB08 | HJT, FPZ, JYH,BZ  | 65.67% | 65.75% | 0 | 45.99 |
| YB12 | HJT, FPZ, HQ, HH, BZ  | 79.89% | 0 | 26.57% | 39.92 |
| YB12 | HJT, FPZ, HQ, BZ  | 84.35% | 52.33% | 30.67% | 58.64 |
| YB12 | PFZ, HQ, HH, BZ  | 84.19% | 29.33% | 1.30% | 42.86 |
| YB12 | HJT, HQ, HH, BZ | 84.84% | 82.33% | 0 | 58.63 |
| YB12 | HJT, FPZ, HQ, HH  | 82.79% | 155.00% | 0 | 63.11 |
| YB12 | HJT, FPZ, HH, BZ  | 87.42% | 106.33% | 95.68% | 93.67 |
| YB15 | CX, BJ, Hh, FPZ, HH | 81.24% | 65.33% | 77.97% | 75.48 |
| YB15 | BJ, Hh, FPZ, HH | 90.77% | 139.00% | 0 | 66.30 |
| YB15 | CX, BJ, Hh, FPZ  | 88.65% | 160.00% | 35.21% | 76.02 |
| YB15 | CX, BJ, FPZ, HH川 | 87.22% | 0 | 0 | 34.88 |
| YB15 | CX, Hh, FPZ, HH | 31.80% | 0 | 21.38% | 19.13 |
| YB15 | CX, BJ, Hh, HH  | 78.93% | 143.67% | 48.44% | 76.10 |
| YB06 | Hh, FPZ, HQ, JYH, HH, BZ  | 83.57% | 43.00% | 0 | 46.32 |
| YB06 | Hh, HQ, JYH, HH, BZ  | 85.37% | 9.00% | 0 | 36.84 |
| YB06 | Hh, FPZ, JYH, HH, BZ  | 87.79% | 25.33% | 0 | 42.71 |
| YB06 | Hh, FPZ, HQ, JYH, BZ | 87.64% | 0 | 0 | 35.05 |
| YB06 | Hh, FPZ, HQ, JYH, HH  | 85.34% | 28.67% | 18.14% | 48.17 |
| YB06 | FPZ, HQ, JYH, HH, BZ  | 88.70% | 10.00% | 66.95% | 58.56 |
| YB01 | CX, BJ, HJT, Hh, FPZ, HQ, JYG, HH, BZ | 87.87% | 0 | 0 | 35.14 |
| YB01 | CX, BJ, HJT, Hh, FPZ, HQ, JYG, HH | 88.97% | 0 | 0 | 35.58 |
| YB01 | CX, BJ, HJT, Hh, HQ, JYG, HH, BZ | 88.49% | 0 | 142.12% | 65.39 |
| YB01 | CX, BJ, HJT, Hh, FPZ, JYG, HH, BZ  | 87.19% | 0 | 0 | 34.87 |
| YB01 | CX, BJ, Hh, FPZ, HQ, JYG, HH, BZ  | 87.36% | 0 | 85.75% | 60.66 |
| YB01 | CX, HJT, Hh, FPZ, HQ, JYG, HH, BZ | 87.56% | 0 | 0 | 35.02 |
| YB01 | CX, BJ, HJT, Hh, FPZ, HQ, HH, BZ  | 87.71% | 37.67% | 0 | 46.38 |
| YB01 | BJ, HJT, Hh, FPZ, HQ, JYH, HH, BZ | 89.23% | 148.33% | 7.56% | 67.95 |
| YB01 | CX, BJ, HJT, Hh, FPZ, HQ, JYH, BZ | 90.38% | 181.67% | 0 | 66.15 |
| YB01 | CX, BJ, HJT, FPZ, HQ, JYH, HH, BZ | 89.83% | 48.00% | 0 | 50.33 |
| YB10 | CX, HJT, FPZ, JYH, BZ  | 61.53% | 0 | 0 | 24.61 |
| YB10 | CX, FPZ, JYH, BZ  | 53.01% | 0 | 98.06% | 50.62 |
| YB10 | CX, HJT, JYH, BZ  | 88.82% | 138.00% | 82.29% | 90.21 |
| YB10 | CX, HJT, FPZ, BZ  | 88.83% | 112.67% | 0 | 65.53 |
| YB10 | CX, HJT, FPZ, JYH  | 88.50% | 43.67% | 0 | 48.50 |
| YB10 | HJT, FPZ, JYH, BZ  | 88.32% | 0 | 0 | 6.89 |
| YB03 | CX, BJ, FPZ, HQ, JYH, HH, BZ  | 79.52% | 0 | 161.99% | 61.80 |
| YB03 | BJ, FPZ, HQ, JYH, HH, BZ  | 83.42% | 89.00% | 0 | 60.06 |
| YB03 | CX, FPZ, HQ, JYH, HH, BZ  | 84.35% | 0 | 0 | 33.73 |
| YB03 | CX, BJ, FPZ, HQ, HH, BZ  | 84.09% | 3.33% | 8.64% | 37.22 |
| YB03 | CX, BJ, FPZ, JYH, HH,BZ  | 82.24% | 274.33% | 59.40% | 75.41 |
| YB03 | CX, BJ, FPZ, HQ, JYH, HH  | 87.88% | 0 | 92.66% | 62.95 |
| YB03 | CX, BJ, FPZ, HQ, JYH, BZ  | 88.70% | 0 | 89.42% | 62.30 |
| YB02 | HJT, Hh, HQ, HH, BZ  | 88.27% | 0 | 0 | 35.30 |
| YB02 | Hh, HQ, HH,BZ  | 78.05% | 0 | 0 | 31.21 |
| YB02 | HJT, Hh, HQ, BZ  | 89.33% | 78.00% | 0 | 59.13 |
| YB02 | HJT, Hh, HQ, HH  | 87.79% | 0 | 0 | 35.11 |
| YB02 | HJT, HQ, HH, BZ  | 81.50% | 0 | 0 | 32.60 |
| YB02 | HJT, Hh, HH, BZ  | 88.31% | 274.33% | 0 | 65.32 |
| YB13 | BJ, Hh, FPZ, HH, BZ  | 88.52% | 0 | 34.56% | 45.77 |
| YB13 | Hh, FPZ, HH, BZ  | 89.14% | 17.33% | 0 | 40.85 |
| YB13 | BJ, FPZ, HH, BZ | 88.74% | 0 | 0 | 35.49 |
| YB13 | BJ, Hh, HH, BZ | 88.14% | 0 | 69.98% | 56.24 |
| YB13 | BJ, Hh, FPZ, BZ | 87.06% | 138.00% | 80.56% | 88.99 |
| YB13 | BJ, Hh, FPZ, HH | 86.37% | 0 | 13.61% | 38.62 |
| YB11 | BJ, Hh, FPZ, JYH, Hh, BZ | 89.03% | 0 | 241.90% | 65.61 |
| YB11 | Hh, FPZ, JYH, HH, BZ | 88.92% | 0 | 229.37% | 65.56 |
| YB11 | BJ, FPZ, JYH, HH, BZ | 89.33% | 275.33% | 204.32% | 95.73 |
| YB11 | BJ, Hh, JYH, HH, BZ  | 89.74% | 0 | 56.37% | 52.80 |
| YB11 | BJ, Hh, FPZ, HH, BZ | 88.06% | 171.33% | 223.97% | 95.22 |
| YB11 | BJ, Hh, FPZ, JYH, BZ  | 88.20% | 89.00% | 254.64% | 95.28 |
| YB11 | BJ, Hh, FPZ, JYH, HH | 87.09% | 0 | 18.14% | 40.27 |
| YB16 | BJ, Hh, FPZ,JYH, BZ  | 88.95% | 0 | 80.13% | 59.61 |
| YB16 | Hh, FPZ, JYH, BZ  | 90.20% | 0 | 126.78% | 66.07 |
| YB16 | BJ, FPZ, JYH, BZ  | 89.78% | 26.00% | 40.17% | 55.76 |
| YB16 | BJ, Hh, JYH, BZ  | 87.95% | 0 | 103.89% | 65.18 |
| YB16 | BJ, Hh, FPZ,BZ | 89.02% | 49.67% | 33.05% | 60.41 |
| YB16 | BJ, Hh, FPZ, JYH  | 85.33% | 93.67% | 56.37% | 79.14 |

Score= Residual moisture×40+ Tyrosinase inhibition×30+ Hydroxyl radical scavenging×30; value＜0 no score