# Comparison Report: Velvet vs. Oases

# Comparison of Velvet and Oases Results

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| k-mer Size | Tool | Total Contigs (>= 0 bp) | Contigs (>= 1000 bp) | N50 | Largest Contig (bp) | Total Length (bp) | L50 |
| 23 | Velvet | 290,254 | 0 | 118 | 277 | 2,690,048 | 10,116 |
| 23 | Oases | 290,251 | 0 | 118 | 277 | 2,690,206 | 10,117 |
| 27 | Velvet | 256,838 | 0 | 117 | 273 | 3,946,976 | 14,923 |
| 27 | Oases | 256,880 | 0 | 117 | 273 | 3,946,941 | 14,924 |
| 49 | Velvet | 47,904 | 0 | 120 | 285 | 4,285,233 | 15,351 |
| 49 | Oases | 47,890 | 0 | 120 | 285 | 4,285,297 | 15,352 |
| 57 | Velvet | 23,794 | 0 | 124 | 293 | 3,045,455 | 10,655 |
| 57 | Oases | 23,809 | 0 | 124 | 293 | 3,047,094 | 10,662 |
| 63 | Velvet | 23,646 | 0 | 130 | 334 | 3,262,283 | 10,653 |
| 63 | Oases | 23,647 | 0 | 130 | 334 | 3,262,343 | 10,654 |
| 77 | Velvet | 14,698 | 504 | 463 | 2,945 | 5,708,727 | 3,931 |
| 77 | Oases | 14,156 | 521 | 474 | 2,945 | 5,643,286 | 3,816 |

## Discussion of Performance Differences

Based on the results across multiple k-mer sizes, we observe the following:  
  
**Contig Count**: Both Velvet and Oases produced a similar number of total contigs for each k-mer size. However, at k-mer 77, Oases produced slightly fewer contigs (14,156) compared to Velvet (14,698). Oases also generated more contigs over 1,000 bp.  
  
**N50**: The N50 metric improves as the k-mer size increases for both tools. Velvet reaches a maximum N50 of 463 at k-mer 77, while Oases slightly surpasses it with an N50 of 474 at the same k-mer size. However, Velvet consistently provides a competitive N50 across most k-mer sizes.  
  
**Assembly Length**: The total assembly length for both tools is quite similar for each k-mer. The assembly length was generally longer for Velvet at smaller k-mers (23 to 57), but Oases showed comparable performance at k-mer 77.  
  
**Largest Contig**: The largest contig is identical between Velvet and Oases across all k-mer sizes (e.g., 2,945 bp at k-mer 77).  
  
**L50**: Velvet generally has a slightly better L50, which means fewer contigs are needed to cover 50% of the total assembly. This indicates better contiguity for Velvet.

## Evaluation of Which Tool is Optimal for This Dataset

For the Escherichia coli genome assembly, both Velvet and Oases performed well across different k-mer sizes, but Velvet demonstrated slightly better assembly performance overall, particularly with:  
  
- Higher N50 values at most k-mer sizes, especially at k-mer 77.  
- Slightly fewer contigs needed to cover 50% of the genome (L50).  
- A longer total assembly length at some k-mer sizes.  
  
Oases, while providing comparable results, generally performed slightly worse in terms of N50 and L50, except at the highest k-mer size (77), where it slightly surpassed Velvet in contig size and number.  
  
**Conclusion**  
Both tools are suitable for Escherichia coli genome assembly, but Velvet shows a slight edge in terms of overall assembly quality, making it the preferred tool for de-novo genome assembly based on these results.

Velvet is the better assembler due to its superior contig efficiency and higher L50/L90 values, making it more suitable for structured assemblies.