ABSTRACT. An important conjecture in percolation theory is that almost surely no infinite cluster exists in critical percolation on any transitive graph for which the critical probability is less than 1. Earlier work has established this for the amenable cases $\mathbb{Z}^2$ and $\mathbb{Z}^d$ for large d, as well as for all nonamenable graphs with unimodular automorphism groups. We show that the conjecture holds for the basic classes of nonamenable graphs with nonunimodular automorphism groups: for decorated trees and the nonunimodular Diestel–Leader graphs. We also show that the connection probability between two vertices decays exponentially in their distance. Finally, we prove that critical percolation on the positive part of the lamplighter group has no infinite clusters.