Using a tunable external cavity tapered diode laser (ECDL) pumped quasi-three-level Nd:YAG laser, a fivefold reduction in threshold and twofold increase in slope efficiency is demonstrated when compared to a traditional broad area diode laser pump source. A TEM00 power of 800 mW with 65% slope efficiency is obtained, the highest reported TEM00 power from any 946 nm Nd:YAG laser pumped by a single emitter diode laser pump source. A quantum efficiency of 0.85 has been estimated from experimental data using a simple quasi-three-level model. The reported value is in good agreement with published values, suggesting that the model is adequate. Improvement of the 946 nm laser due to the ECDL’s narrow spectrum proves to be less significant when compared to its spatial quality, inferring a broad spectrum tapered diode laser pump source may be most practical. Experimental confirmation of such setup is given.