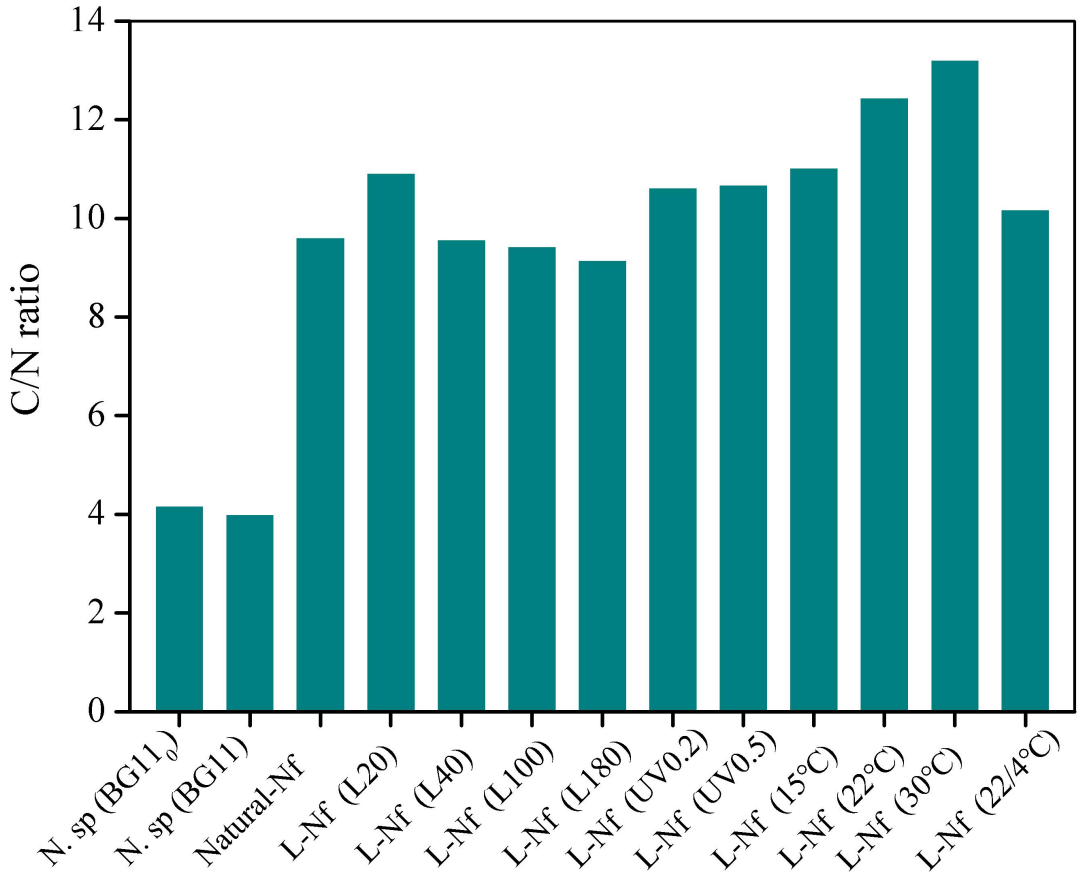

Figure S2 The C/N ratios in natural samples (Natural-Nf) and liquid suspension cultures (L-Nf) of *N. flagelliforme*. Liquid suspension cultures were cultivated under different light intensities, UV intensities and temperatures. L20, 40, 100 and 180, light intensities of 20, 40, 100 and 180 μmol photons m^{-2} s^{-1}. UV0.2 and 0.5, UV-B intensities of 0.2 and 0.5 W m^{-2}. 22/4 °C, the alternating change of 22 and 4 °C (12 h: 12 h). N. sp, *Nostoc* sp. PCC 7120, used for comparison.

Materials and methods for this experiment

Natural samples of *Nostoc flagelliforme* collected at three locations (Hongshibao and Yinchuan regions of Ningxia Province, Sunitezuoqi of Inner Mongolia, China) in 2016 were washed 3–5 times with deionized water and air-dried. Air-dried samples (1.5–2.0 mg) were smashed in a grinder and wrapped with silver paper. Then, their C and N contents were analyzed in a Vario EL III Elemental Analyzer (Elementar, Germany) with the CHNOS model. Aminobenzenesulfonic acid (MW = 173.19) was

used as the standard. The C/N ratios were calculated. The average value of the three C/N ratios is shown in Figure S2.

The model species *Nostoc* sp. PCC 7120 was used for comparative aim. 100 μL of cell suspension was inoculated into BG11 or $BG11_0$ solution (1.9 L) and cultivated with ventilation at 30 °C under continuous illumination of 20 μmol photons m^{-2} s^{-1}. The cultures at logarithmic phase were collected by centrifugation and washed 3 times with deionized water. Then the cultures were dried in an oven at 70 °C until constant weight, followed by the C/N ratio assay.

For liquid suspension cultures of *N. flagelliforme*, 200 μL of cell culture was first inoculated into 1.8 L of $BG11_0$ solution and cultivated at 25 °C under continuous illumination of 20 μmol photons m^{-2} s^{-1}. The flasks were gently shaken two times per day. At the logarithmic phase, they were collected and sub-cultivated in soil solutions. For soil solution preparation, surface soils were collected from the native habitat of *N. flagelliforme* in Yingchuan City, China. Five grams of soils were added into 600 ml of deionized water and stirred for 30 min in a magnetic stirrer. After centrifugation at 6,000 rpm (Eppendorf 5810/5810R, Germany) for 5 min, the supernatant was filtered by filter paper and autoclaved (121 ℃, 20 min). Then the soil solution was divided into 12 flasks (50 mL per flask). Also, cell suspension of *N. flagelliforme* was equally inoculated into the flasks and cultivated under various conditions, including different temperatures (15, 25 and 30 ℃, respectively; continuous white light of 20 μmol photons m^{-2} s^{-1}), temperature fluctuation (25 ℃ under 20 μmol photons m^{-2} s^{-1} for 12 h; 4 ℃ in darkness for 12 h), different light intensities (12 h white light of 20, 40, 100 and 180 μmol photons m^{-2} s^{-1}, respectively; 12 h in darkness; 25 ℃) and different UV-B intensities (12 h of 0.2 and 0.5 W m^{-2}, respectively; 12 h white light of 20 μmol photons m^{-2} s^{-1}; 25 ℃). After 10 days of cultivation, cell cultures were collected with filter paper and dried at 70 °C until constant weight. The C/N ratios were similarly assayed.