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Effects of sand burial and wind disturbances on moss soil crusts in a revegetated area of the Tennger Desert, Northern China

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Sand burial and wind are two predominant natural disturbances in the desert ecosystems worldwide. However, the effects of sand burial and wind disturbances on moss soil crusts are still largely unexplored. In this study, two sets of experiments were conducted separately to evaluated the effects of sand burial (sand depth of 0, 1, 2, 3 and 4 mm) and wind blowing (wind speed of 0.2, 3, 6 and 9ms-1) on ecophysiological variables of two moss soil crusts collected from a revegetated area of the Tengger Desert, Northern China. Firstly, the results from the sand burial experiment revealed that respiration rate was significantly decreased and that moss shoot elongation was significantly increased after burial. In addition, Bryum argenteum crust showed the fastest speed of emergence and highest tolerance index, followed by Didymodon vinealis crust. This sequence was consistent with the successional order of the two moss crusts that happened in our study area, indicating that differential sand burial tolerance explains their succession sequence. Secondly, the results from the wind experiment showed that CO_2 exchange, PSII photochemical efficiency, photosynthetic pigments, shoot upgrowth, productivity and regeneration potential of the two moss soil crust mentioned above were all substantially depressed. Furthermore, D. vinealis crust exhibited stronger wind resistance than B. argenteum crust from all aspects mentioned above. And this is comparison was identical with their contrasting microhabitats with B. argenteum crust being excluded from higher wind speed microsites in the windward slopes, suggesting that the differential wind resistance of moss soil crusts explains their microdistribution pattern. In conclusion, the ecogeomorphological processes of moss soil crusts in desert ecosystems can be largely determined by natural disturbances caused by sand burial and wind blowing in desert ecosystems.