Ion stochastic heating by a spectrum of Alfvén waves is investigated. When the amplitude of the waves is small, the components of the ion velocity have several distinct frequencies, and their motions are quasi-periodic. However, when the amplitude of the waves is sufficiently large, the components of the ion velocity have a spectrum of continuous frequencies near the ion cyclotron frequency due to the nonlinear coupling between the Alfvén waves and the ion gyromotion, and the ion motions are stochastic. Compared with the case of a monochromatic Alfvén wave, the threshold of the ion stochastic heating by a spectrum of Alfvén waves is much lower. Even when their frequencies are only several percent of the ion cyclotron frequency, the ions can also be stochastically heated. The relevance of this heating mechanism to solar corona is also discussed.