The aim of this paper is to review the literature that has addressed direct and inverse problems in option pricing in a fuzzy setting. In a direct problem, the stochastic process for the underlying asset is assumed and the option prices are derived by no-arbitrage or equilibrium conditions. In an inverse problem, the option prices are taken as given and used to infer the underlying asset process. Models are divided into discrete-time and continuous-time ones. Special attention is paid to real options, a particular class of nonfinancial options that are used to evaluate real investments. Directions for future research are outlined. In particular in inverse problems, there is still room for promising research, both in discrete time and in continuous time. Moreover, given that many proposed methods remain difficult to use in practice, there is mainly the need to apply the fuzzy models obtained on real market data and to compare the results with nonfuzzy techniques in order to assess the usefulness and the improvements in the modeling of imprecise data with fuzzy sets and fuzzy random variables.