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Masting in perennial plants is a periodic phenomenon in which plants have years of low reproduction followed by a year of abundant seed-setting, or a mast year. We set out to construct a life history model for perennial plants which incorporates the effects of herbivory, or the predation on plant seeds. Based on prior models and empirical evidence, we predicted that periodic reproduction would optimize plant fitness. In particular, we generalized the Iwasa-Cohen life history model by including the effects of herbivory on plant reproduction. Through our life history model, we found that the optimal reproductive strategy is one which is periodic such that a mast year occurs every J years. (Received September 21, 2010)