Interplanetary coronal mass ejections (ICMEs) often possess a negative proton thermal anisotropy, $A_p = T_{\perp}^p / T_{\parallel}^p < 0$ ($T_{\parallel}, T_{\perp}$: parallel and perpendicular temperatures, respectively) so that right-hand polarized electromagnetic ion cyclotron waves (EICWs) may be amplified by a kinetic instability [Farrugia et al., 1998a]. However, in view of the low proton beta of ICMEs, several physical parameters, besides $A_p$, need to be in the right range to excite this instability with significant growth rates. In this paper we present a parametric study of EICWs aimed at identifying those parameters which are most influential in fostering the emission of these waves in ICME scenarios. We analyze here the influence of: (a) thermal and suprathermal protons, (2) thermal alpha particles ($\alpha$s), and (3) thermal electrons. We solve the dispersion relation of EICWs including protons, $\alpha$s and electrons, all modeled with bi-Maxwellian distribution functions, and a minority population of suprathermal protons using a kappa function for the velocity component along the field. For physical regimes of ICMEs we find that the instability depends critically on the values of the following parameters: proton beta, proton thermal anisotropy, relative abundance of the suprathermal protons, $\alpha$-to-proton relative abundance, $\alpha$-to-proton temperature ratio, $\alpha$ particle thermal anisotropy, electron-to-proton temperature ratio, and thermal anisotropy of electrons. The effect of these parameters on the instability is either direct (when they increase the number of resonant particles) or indirect (when they decrease the phase speed of the wave so that more particles can resonate). Data surveys on EICWs should take into account the whole set of parameters indicated here, since the expected level of wave excitation results from their combined action. The study may be useful in understanding the considerable level of magnetic fluctuations observed in interplanetary CMEs by the Wind spacecraft.