Glufosinate resistance in sugarcane was developed by whole plant and cell culture selection. Fifteen of sugarcane clones were planted in the field according to a factorial design in RCB to compare the different genotypes and four levels of glufosinate application (0, 0.50, 1.00 and 1.50 kg ai/ha). The effects of glufosinate on the physiological response to crop visual injury, plant height, fresh weight and dry weight were measured. The degree of tolerance was evaluated at 5, 10 and 14 days after application. It was demonstrated that KPS 96-8-5, U-Tong 3 and KPS 96-16-07 tended to tolerate the herbicide at 1.00 kg ai/ha, while K 8-42 and K 10-69 were the most susceptible clones. Cell culture selection was attempted using callus culture and suspension culture induced from young tight furled leaves of the three tolerant sugarcane clones. The callus and suspension cells were cultured on MS-modified medium. Using a stepwise selection with increasing concentrations of glufosinate at $10^{-8}$ - $10^{-5}$ M, the cell from KPS 96-8-5 resist to $10^{-5}$ M glufosinate was obtained through cell suspension culture. It was referred to as $10^{-3}$ M glufosinate-resistant sugarcane cell, this indicates the resistant index of resistant cell was 4,750 fold more resistant than normal cell. The resistant cell was used for biochemical mechanism studies; glutamine synthetase (GS) activity assay and ammonia accumulation. Activity of GS enzyme of the resistant cell was about 2.33 fold higher than that of the normal cell at 25 hours after treatment (HAT). At 25 HAT, the ammonia accumulation of resistant cell was lower than that of normal by about 4.4 fold. Furthermore, the $10^{-5}$ M glufosinate-resistant sugarcane cell had no cross resistance to other herbicides such as glyphosate, imazethapyr and primisulfuron.