Traditionally, peanut cultivar development has been dominated by conventional breeding methods, which have greatly increased yield and will continue to play an important role in peanut genetic improvement. Applications of MAS (marker-assisted selection) in plant breeding have been shown to increase significantly the rate of genetic gain when compared to conventional breeding. The cost of genotyping and throughput are still a concern in marker-assisted selection in peanut breeding. The objective of this study is to introduce a simple, low-cost, and high-throughput protocol for genotyping in peanuts. The developed system was based on polyacrylamide gel to separate PCR amplified DNA fragments and silver stain to visualize the bands. In this system, one electrophoresis unit (cost less than $200) can hold two vertical 52-sample slab gels, and the cost of the unit is less than $200. The electrophoresis runs about 1 hr and 40 min at 180 V for a 9% polyacrylamide gel or 1 hr and 20 min at 160 V for a 6% polyacrylamide gel. The silver stain takes 30 min. After stained, the gels can be placed on the light-box for genotyping score and the gel image can be photographed using digital camera. The cost per gel is estimated at $0.54 and the cost for silver stain is estimated at $0.37. Therefore, the total cost could be as low as $0.018 per data point, excluding PCR reaction and DNA extraction cost. This system has been successfully used in our peanut genetic mapping, and could generate over 1,000 data points by one person a day.