The date palm is one of the oldest cultivated trees and is critical to the development of arid land. The date palm is a dioecious monocot with separate male and female trees, however only the female trees produce the fruit that is sought after in farming. This presents a challenge in crop development, as it is impossible to distinguish trees until they flower approximately 5-8 years after planting. We have developed two Polymerase Chain Reaction (PCR) based assays capable of sex differentiation in multiple date palm cultivars. The primers are designed across gender specific polymorphisms and demonstrated greater than 90% accuracy in distinguishing date palm gender across multiple varieties. These assays should be helpful in rapidly distinguishing date palm gender from the earliest stages that DNA can safely be collected. As the sex-linked region is fine mapped these assays will be refined to take into account this information. For now, our assays provide a vast savings in time and effort over existing approaches.