Soybean (Glycine max) is not only the number one oil and protein crop in the U.S., but also provides an important source for studies on seed physiology, biochemistry and plant-microbial interactions. These studies and values of soybean will be significantly enhanced, if the function of soybean genes could be assigned at a genomic scale. Knockout of a particular gene can be achieved by mutation-based strategies, but their use is more limited than that of RNA silencing. Hence, RNA silencing has now become the preferred methodology for genome-wide research and also for the genetic improvement of crop plants. The primary goal of this work is to improve RNA silencing technology as a tool to analyze gene function and manipulate commercial traits in soybean. We have developed two approaches towards the silencing of soybean genes: one based on hpRNA, and the second emphasized on the use of an atasiRNA. The RNA silencing assays developed in this proposal targeted one economically important gene family, GmFAD3, which were employed as a test model to provide feasibility studies for the wider application of RNA silencing in soybean. We compared the silencing efficiency and then characterized the specificity of hpRNA and atasiRNA mediated gene silencing. Furthermore, we investigated if miR390, which is common in all plant species, could be employed for atasiRNA technology.