



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Arpita Singhal	Project Number J0524
Project Title Herbalism as a Hypoglycemic Agent: Evaluation of Alpha Amylase Inhibition by Different Medicinal Plants	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Diabetes mellitus, a carbohydrate metabolism disorder of the endocrine system, affects more than 100 million people around the world and appears in one of two types: Type 1 or Type 2. Type 1 diabetes occurs when the body produces no insulin, whereas Type 2 occurs when the body produces less insulin, or the cells do not recognize all the insulin. This project tests ten medicinal plants for their alpha amylase inhibitory properties. Alpha amylase hydrolyzes complex carbohydrates into simple sugars. Insulin, a hormone, gives signals to the cells to convert glucose into energy. If the amylase activity is inhibited, the same amount of glucose is produced in a smaller amount of time; thus less insulin can transport the smaller amount of blood sugar into cells; thereby, the blood glucose level after a carbohydrate-filled meal is reduced.</p> <p>Methods/Materials Control: the solution that represents 100% enzyme activity and contains only the amylase and the starch solution; Independent variable: the ten medicinal plant extracts; Dependent variable: the amylase activity inhibition. Each of the ten plants is extracted in five solvents ranging from polar to non-polar. The inhibitory properties of each plant extract are evaluated using a qualitative test and a quantitative assay.</p> <p>Results The following top five medicinal plants: T. foenum, M. charantia, E. officinalis, C. longa, and C. sinensis demonstrated significant alpha amylase inhibition; however, T. foenum inhibited the amylase activity the most in comparison to the control and other plant extracts. In cold water it exhibited 70% amylase activity inhibition; in hot water it demonstrated 61% inhibition; in methanol it displayed 49% inhibition; in isopropanol it showed 46% inhibition; and in acetone it exhibited 32% inhibition.</p> <p>Conclusions/Discussion This research shows that T. foenum inhibits the alpha amylase activity the most, partly supporting my hypothesis that the C. sinensis extracts would inhibit the amylase activity the most. T. foenum seeds displayed the most inhibitory potential in all solvents, except in acetone since the inhibitory bioactive materials were not extracted by the acetone. Any of the top five plants can act as effective hypoglycemic agents because they will give insulin enough time to regulate the blood sugar level. This discovery could lead to a possible solution for Type 2 diabetes.</p>	
Summary Statement In this study I tested ten medicinal plants for their amylase inhibitory potential and identified T. foenum as a natural alternative to diabetic medications; this study could lead to a possible therapeutic solution for Type 2 diabetes.	
Help Received I thank Dr. Roger Terrill from the San Jose State University for letting me work in his laboratory and use his equipment; my science teacher for her guidance; and my family for their support.	