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Determination of Palmitoleic Acid and Corosolic Acid Present in Insulin Plant (Costus Igneus)

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Abstract: The insulin plant is a traditionally used medicinal plant and a common member of ornamental plants in south Indian Gardens. Leaves are the most important part which produces significant antidiabetic activity. It reduces fasting sugar level as well as postprandial blood glucose levels. It was found that chewing on one fresh leaf of the insulin plant or consuming 1 teaspoon of the dried leaf powder daily helps in regulating blood glucose levels in persons with diabetes. The leaves of Insulin Plant contain corosolic acid and palmitoleic acid which helps to generate insulin thereby treating diabetes. It is believed that consumption of the insulin plant leaves helps lower the blood glucose levels, and diabetics who consumed the leaves of this plant report a fall in their blood glucose levels. The dried leaves are ready to be steeped just like you make a cup of tea. Boil the water until it is boiling and put the insulin leaves into the glass. Pour the boiling water into the glass which there is some dried insulin leaves. Wait a moment until the water inside the glass turns into brown. In the above studies it was found that the corosolic acid and palmitoleic acid present in the insulin plant have the ability to cure cardiovascular disease and lower blood sugar level. Glycolysis pathway, fatty acid synthesis, drug compounds and drug indication was also analyzed. The drug molecules acarbose and albiglutide present in palmitoleic acid and corosolic acid have good disease curing property.
Keywords: Costus igneus, palmitoleic acid, corosolic acid, glycolysis pathway, Drug indication, fatty acid biosynthesis.

I. INTRODUCTION

The insulin plant also called as costus igneus was a traditional medicine used to lower blood sugar level. These plants have large fleshy leaves and found mainly in eastern Brazil in India it is called as insulin plant. Insulin plant is a medicinal plant and capable of having magic cure for Diabetes. Leaves of this magical plant helps to build up insulin by strengthening beta cells of pancreas in the human body thus popularly known as “Insulin plant ”A research was undertaken to study about the leaves of the insulin plant in which it shows that they contain high quantities of palmitic acid and corosolic acid. Therefore, more research is needed that confirms the insulin plant's positive effects on blood glucose, apart from that it is also safe for humans. This plant have nearly 150 species. Costus is the largest in the family, and found primarily in tropical climates. Though native to the Americas, this plant can be found growing densely in the gardens of Southern India, where has received the nickname “Insulin Plant” The palmitoleic acid and corosolic acid are the two acids present in the leaf of insulin plant which helps to generate insulin thereby treating diabetes. It is believed that consumption of the insulin plant leaves helps lower the blood glucose levels, and diabetic patients who consumed the leaves of this plant report a fall in their blood glucose levels. The study also found that chewing on one fresh leaf, tea made from plant leaf and dry powder of the insulin plant or using leaf powder in salads daily helps in regulating blood glucose levels.

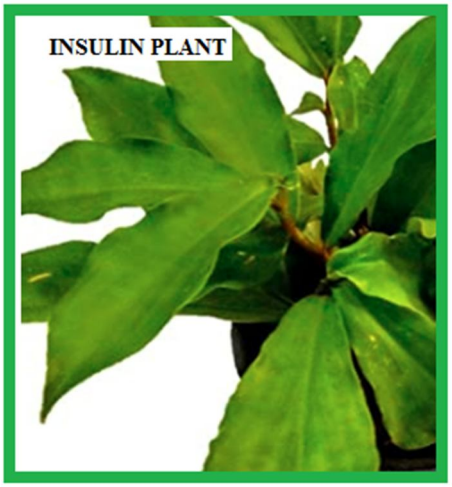

Figure1 Insulin plant

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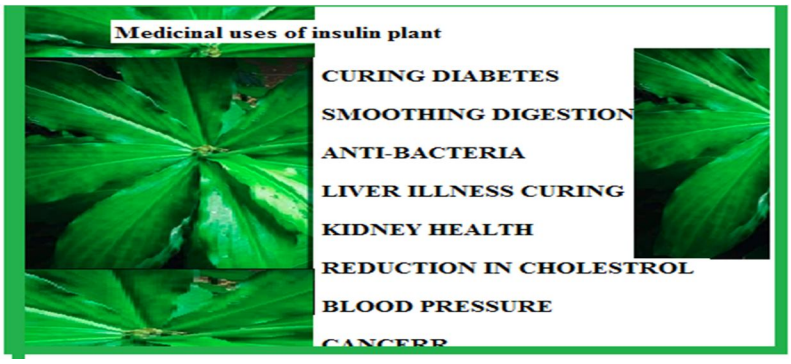

Figure 2 Medicinal Uses

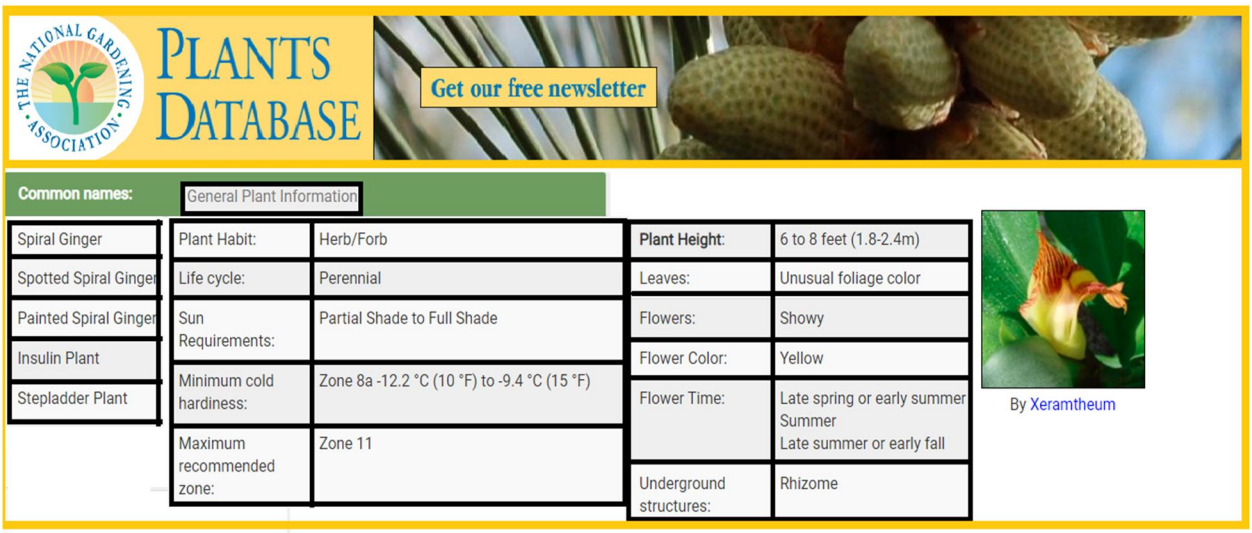

Figure 3 General Information about the Plant

A. Biological Actvity and Chemical Present in the Plant.

Figure 4 and Figure 5 represents the biological activity and the chemicals involved in the plant was also analyzed using Dr.Duke's phytochemical and Ethno botanical Database.

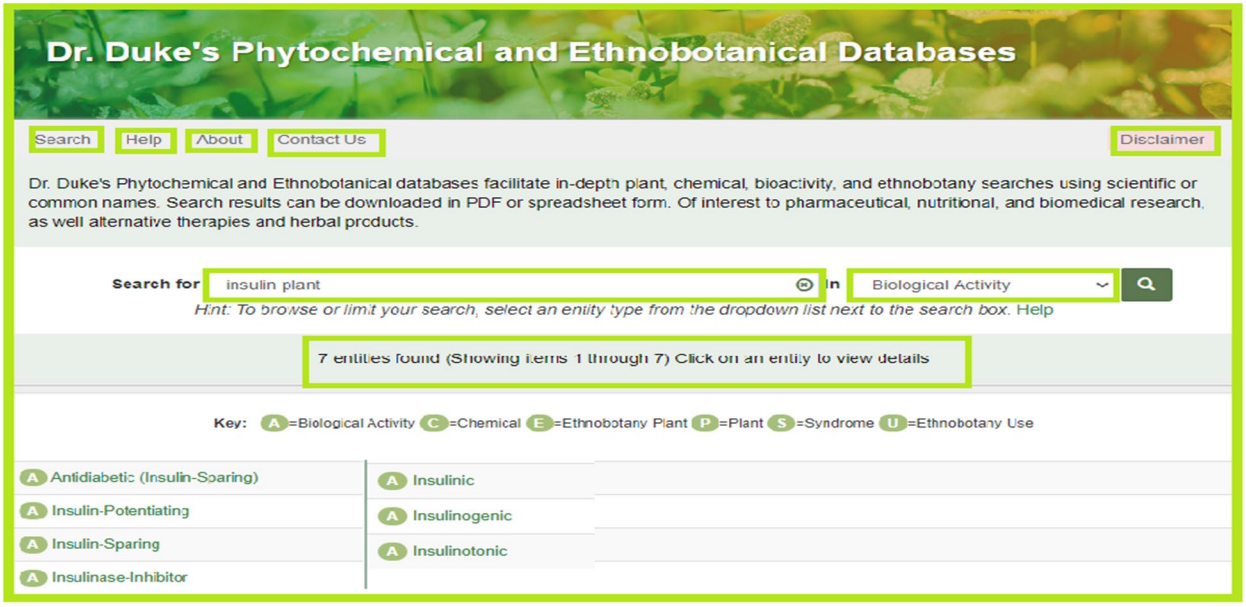

Figure 4 Biological activity of insulin plant

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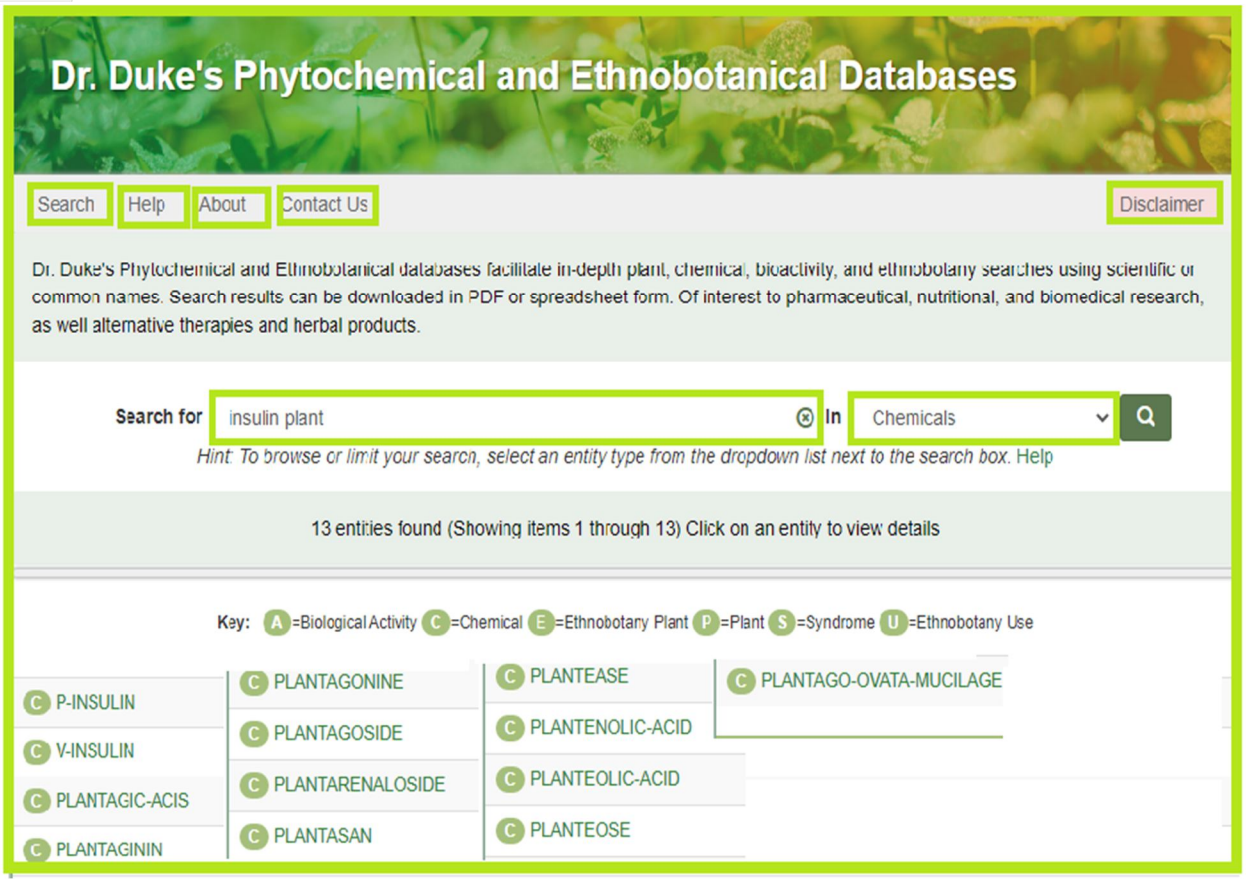
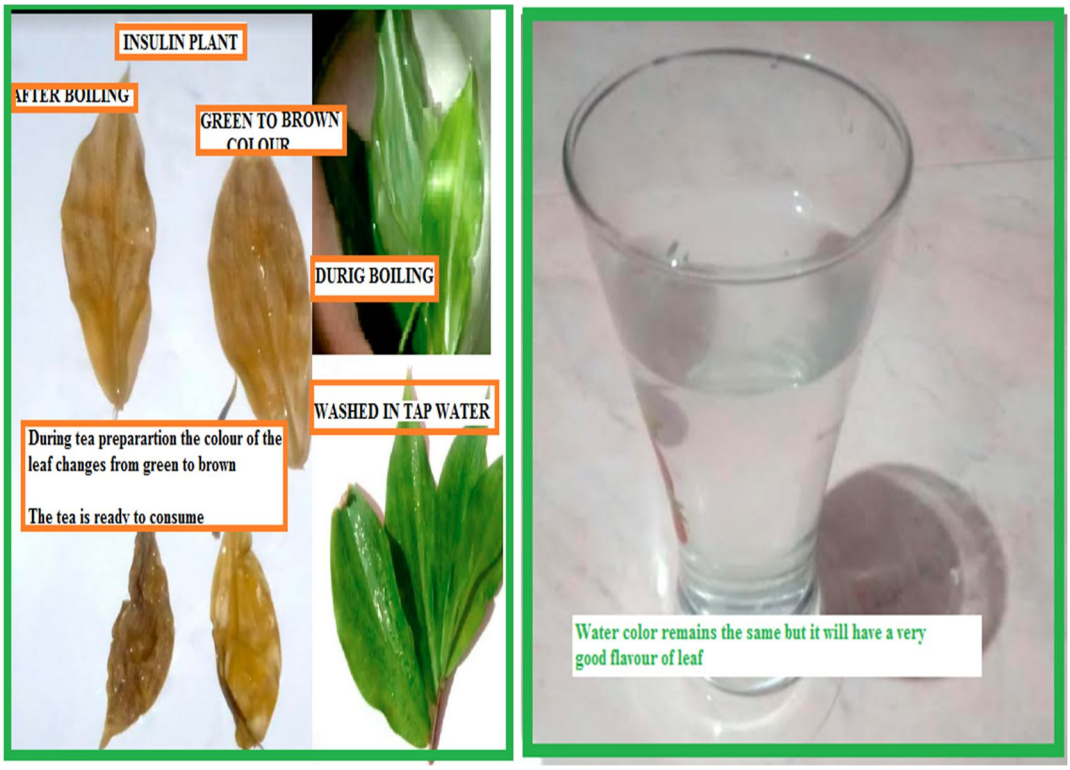


Figure 5 Chemicals Present In Insulin Plant

B. Tea Preparation Procedure



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II. ROLE OF PALMITOLEIC AND CROSOLIC ACID PRESENT IN INSULIN PLANT

A. Palmitoleic Acid

In preclinical and human epidemiological and intervention trials, palmitoleic acid (POA) has shown anti-inflammatory and lipid lowering effects linked to prevention of metabolic syndrome including cardiovascular disease and insulin resistance associated with diabetes and obesity. Palmitoleic acid helps to prevent stroke in diabetes patient. The people with diabetes have high risk of getting stroke so insulin plant can also be used to strengthen heart. It is postulated to have anti-thrombotic effects, which can help prevent stroke (Abraham et al., 1989)

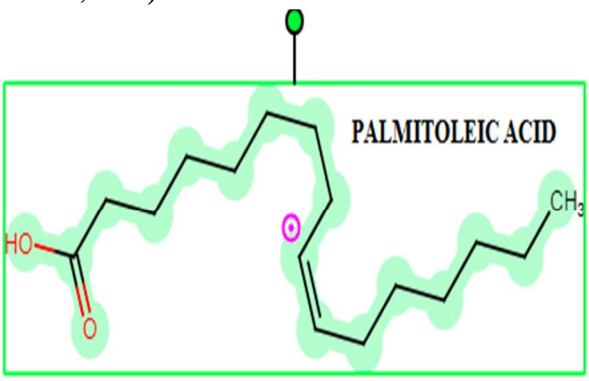


Figure 6 Palmitoleic acid structure

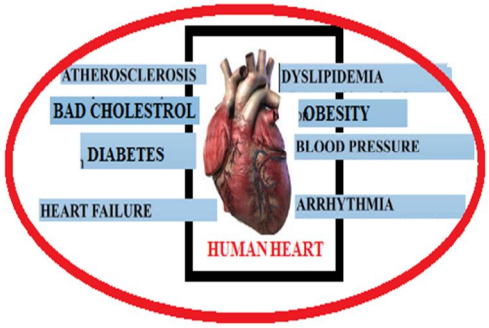
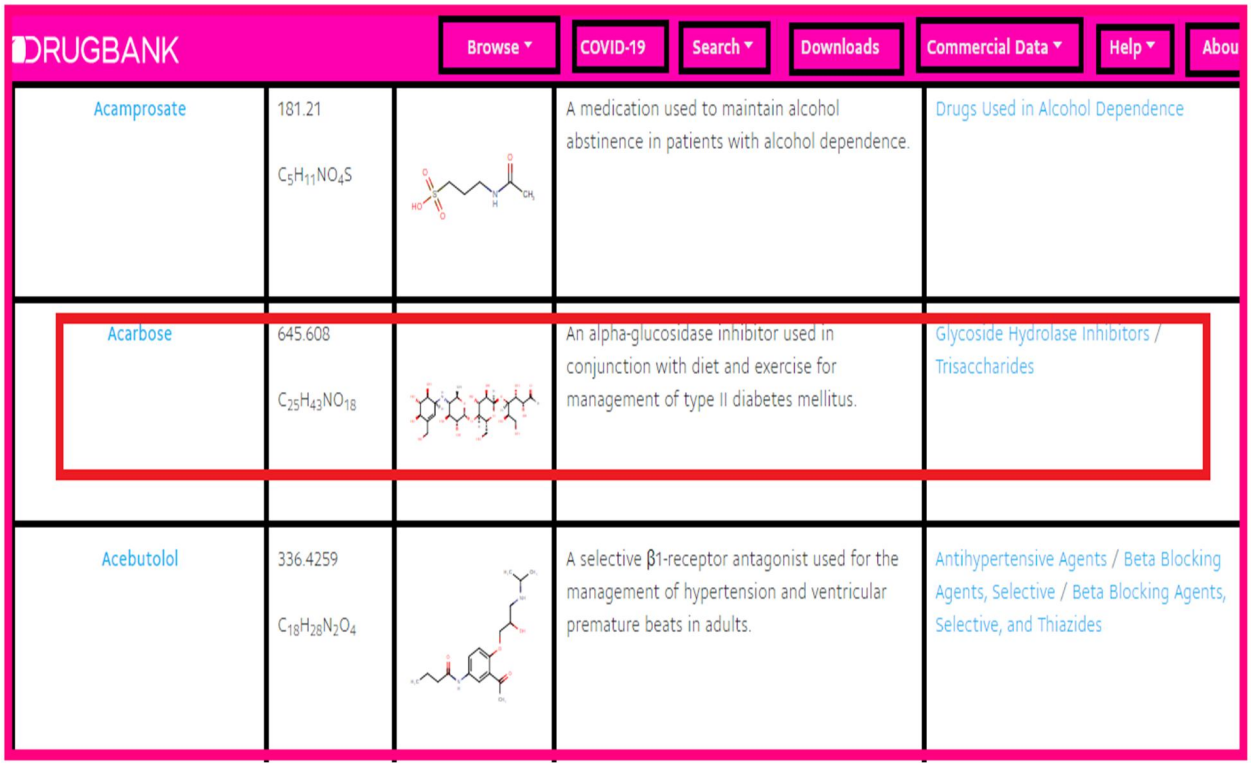


Figure 7 Heart disease

Dietary sources of palmitoleic acid include a variety of animal oils, vegetable oils, and marine oils. This compound belongs to the class of organic compounds known as long-chain fatty acids. These are fatty acids with an aliphatic tail that contains between 13 and 21 carbon atoms. (www.sciencedaily.com)

B. Drugs Made From Palmitoleic Acid



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Acamprosate	181.21 $C_5H_{11}NO_4S$		A medication used to maintain alcohol abstinence in patients with alcohol dependence.	Drugs Used in Alcohol Dependence
Acarbose	645.608 $C_{25}H_{43}NO_{18}$		An alpha-glucosidase inhibitor used in conjunction with diet and exercise for management of type II diabetes mellitus.	Glycoside Hydrolase Inhibitors / Trisaccharides
Acebutolol	336.4259 $C_{18}H_{28}N_2O_4$		A selective β1-receptor antagonist used for the management of hypertension and ventricular premature beats in adults.	Antihypertensive Agents / Beta Blocking Agents, Selective / Beta Blocking Agents, Selective, and Thiazides

Figure 8 Drug Indication.

Using DrugBank database the drug molecule acarbaose made from palmitoleic acid where found to be effective in treating diabetes.

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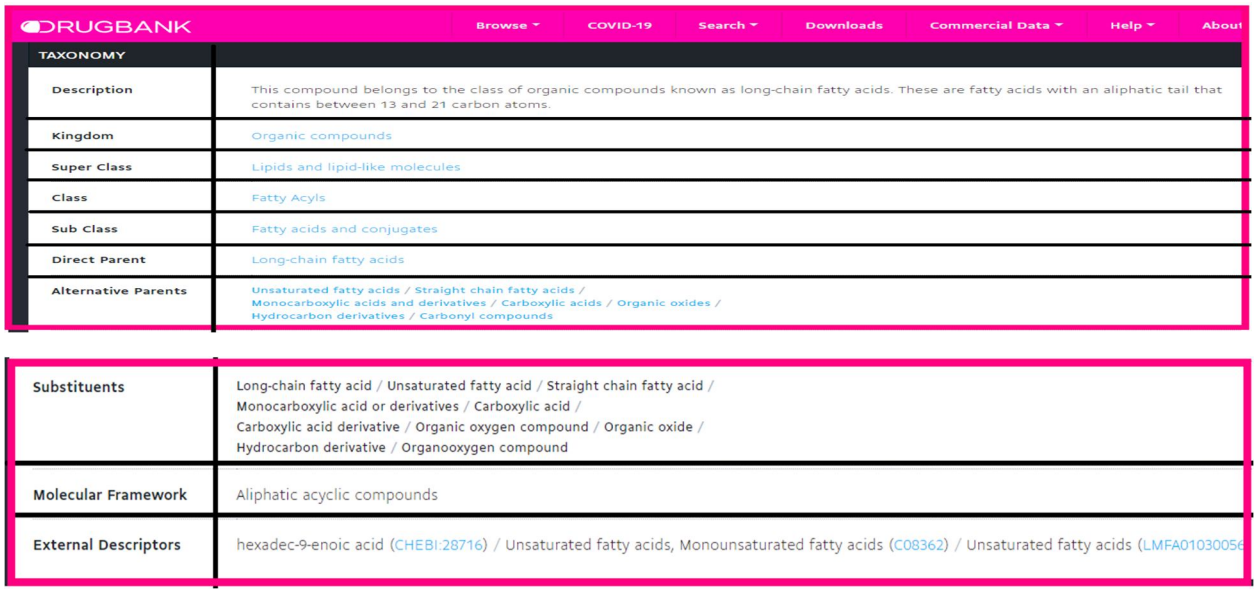

Figure 9 Taxonomy.

C. Corosolic Acid

Corosolic acid may improve the insulin pathway. The action of insulin is mediated by tyrosine phosphorylation and initiated by the binding of insulin to the insulin receptor. Corosolic acid may act as an insulin sensitizer, enhancing insulin receptor B phosphorylation indirectly by inhibiting certain nonreceptor protein tyrosine phosphatases. Corosolic acid may also enhance GLUT4 glucose transporter processing of glucose uptake into muscle cells. Another study reported that corosolic acid inhibited gluconeogenesis by increasing the production of the gluconeogenic intermediate fructose-2, 6-bisphosphate in isolated hepatocytes. Corosolic acid may promote glycolysis.**(** https://www.drugs.com/npp/corosolic-acid.html)

III. GLYCOLYSIS PATHWAY

Glycolysis is the pathway that converts glucose $C_6H_{12}O_6$, into pyruvate, CH_3COCOO^-, and a hydrogen ion, H^+. The free energy released in this process is used to form the high-energy molecules ATP and NADH.Glycolysis is a sequence of ten enzyme-catalyzed reactions. Wikipedia Glycolysis is a pathway converting glucose into pyruvate, the energy which is released will utilize in the form of ATP and NADH molecule.

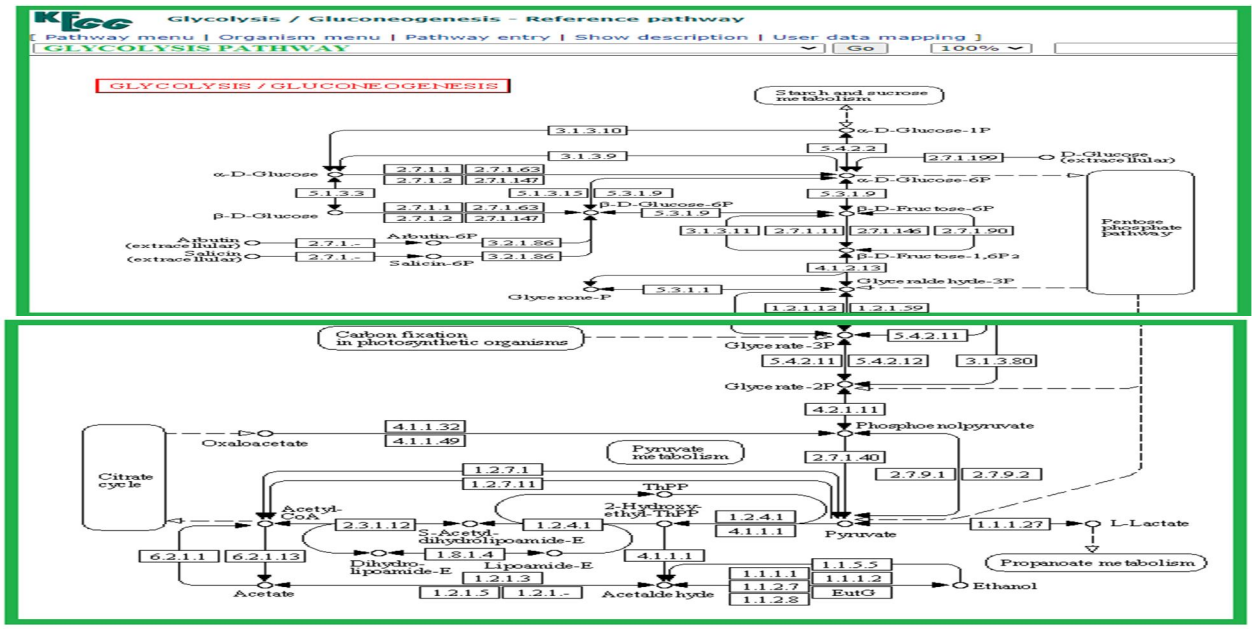

Figure 10 Glycolysis pathway for corosolic acid.

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Glycolysis is the process of converting glucose into pyruvate and generating small amounts of ATP.

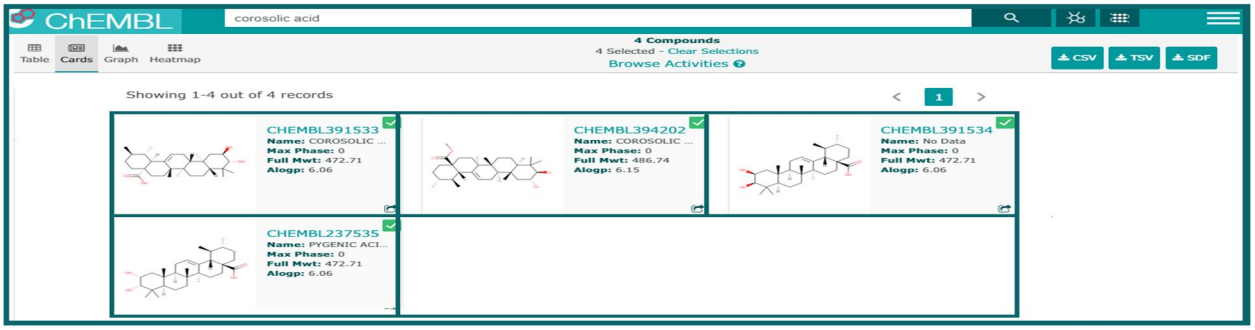

Figure 11 Drug compound for Corosolic acid.

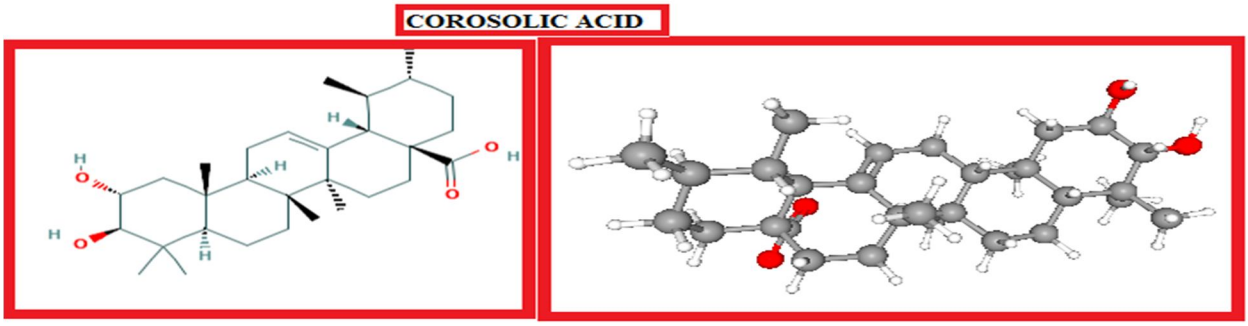

Figure 12 Corosolic acid Structure.

Corosolic acid

#	Structure	CTD Chemical ID	Chemical Name	Disease Source	CTD Disease ID	Disease	Evidence	Evidence
1		C113861	corosolic acid	MeSH	D056486	chemical and drug induced liver injury and diabetes	therapeutic	26033013
2		C113861	corosolic acid	MeSH	D010212	papiloma	therapeutic	26513295
3		C113861	corosolic acid	MeSH	D012878	cancer	therapeutic	26513295

Figure 13 Corosolic acid and disease association

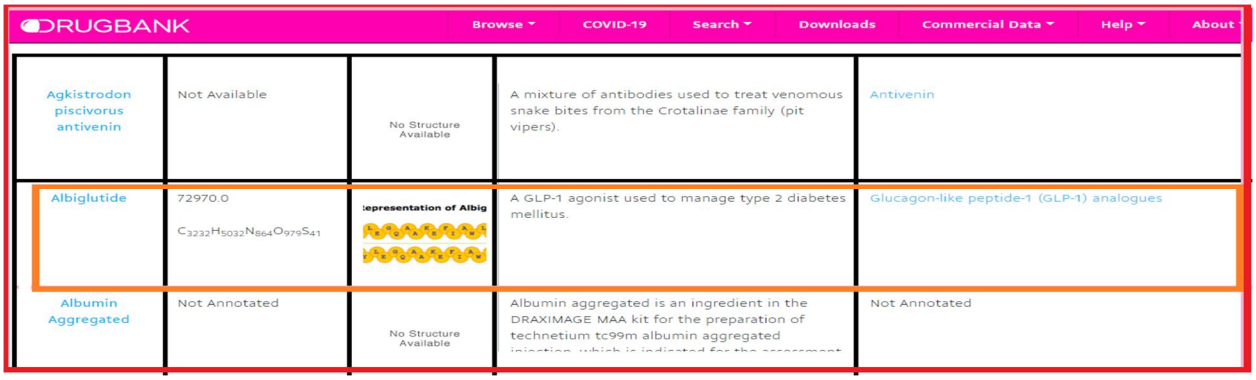

Figure 14 Drug indication for corosoloic acid.

Figure 11,12, 13 and 14 represents the structure, drug compounds and drug indication for corosolic acid an important organic acid present in the plant costus igneus.The drug molecule albiglutide present in the plant acid helps to manage type-2 diabetes.

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IV. CONCLUSION

The insulin plant also called as costus igneus was a traditional medicine used to lower blood sugar level. These plants have large fleshy leaves and found mainly in eastern Brazil in India it is called as insulin plant. Insulin plant is a medicinal plant and capable of having magic cure for Diabetes. The tea and powdered extract made from this plant have good healing property. Taking this leaf by chewing in an empty stomach reduces blood sugar level, bad cholesterol, blood pressure and heart diseases. The cogneus igneus plant was a gift to mankind from god. Too much of anything is good for nothing so it is better to take 3 to4 leaf per day not more than that .The drug molecules acarbose and albiglutide present in palmitoleic acid and corosolic acid of insulin plant have good disease curing property so in future this plant can be used to find drug molecules for the treating diabetes and other disease related to diabetes.

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[1] www.wikipedia.com
[2] www.sciencedirect.com.
[3] https://www.drugs.com/npp/corosolic-acid.html.

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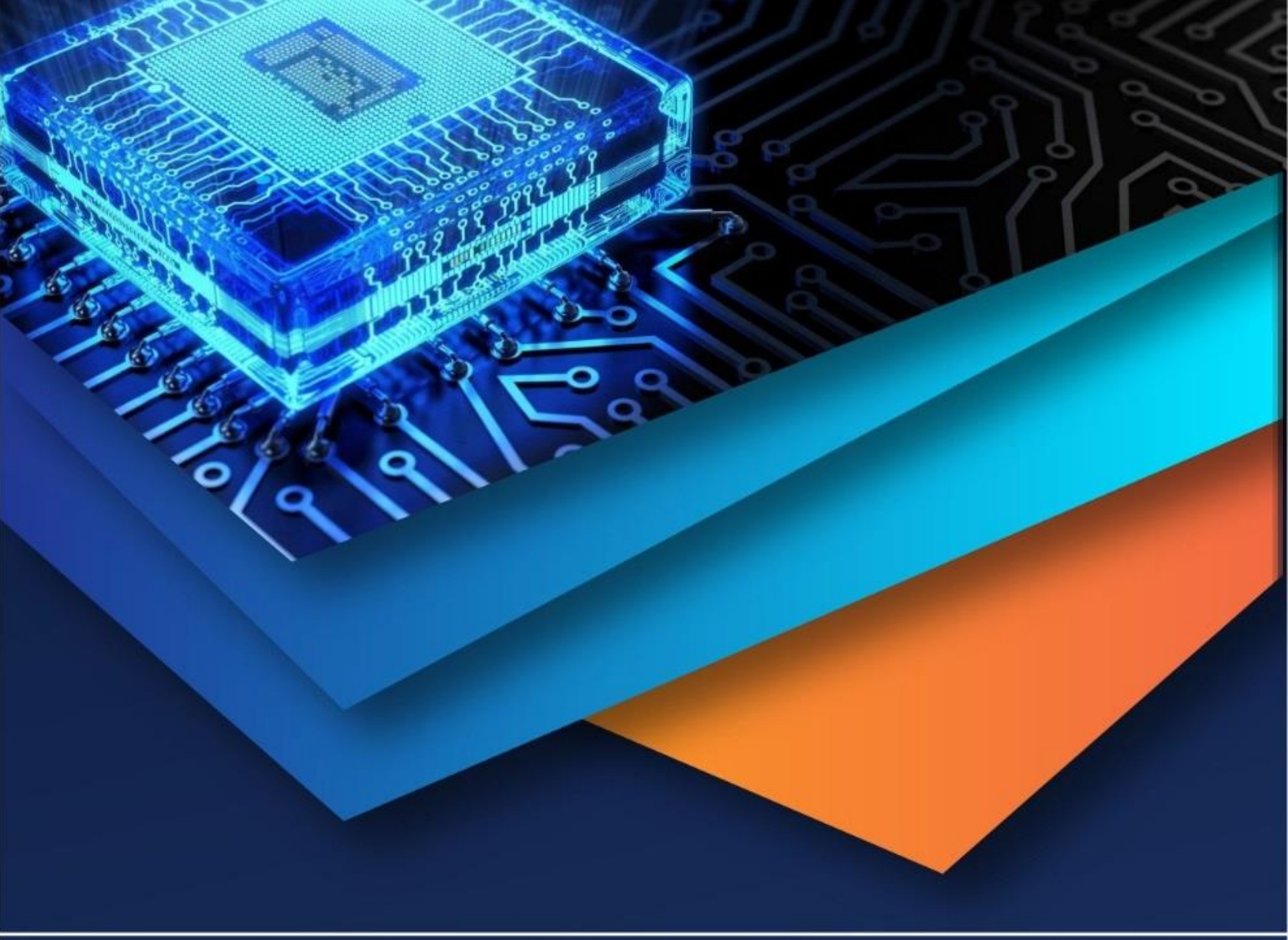

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