



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

Name of the Student : **SUKUMAR PUROHIT**

Roll Number : **166151007**

Programme of Study : **Ph.D.**

Thesis Title:  
**Applications of Passion Fruit Extracts as Bioactive Pharmaceuticals, Biodiesel Additive for Oxidation Stability and Corrosion Resistance**

Name of Thesis Supervisor(s) : **Prof. Vaibhav V. Goud & Prof. Lingaraj Sahoo**

Thesis Submitted to the Department/ Center : **School of Energy Science and Engineering**

Date of completion of Thesis Viva-Voce Exam : **27.09.2023**

Key words for description of Thesis Work : **Bioactive Pharmaceuticals, Oxidative stability, Corrosion Resistance**

---

**SHORT ABSTRACT**

Fruits and vegetables are frequently consumed because of their contents - minerals, dietary fibers, vitamins, and antioxidants which are beneficial for the health. In developing countries there are very limited to negligible waste management policies. As a result, most of the waste materials are directly exposed to the open environment causing severe environmental pollution. Agro-waste materials are having enormous potential for valorization as they contain abundant bioactive phytochemicals, including polyphenols, anthocyanins, tannins, glycosides, vitamins, alkaloids, and many more. These compounds have also profound therapeutic values as antidiabetic, antimicrobial, anticancer, and so on. Moreover, the natural antioxidant extracted from this waste can also be utilized as natural additives to second-generation biofuels (biodiesel) for their quality improvement as oxidative stabilizers and corrosion inhibitors. Northeast India is bestowed with two biodiversity hotspots with variety of flora and fauna. Passion fruit is a less popular plant cultivated in these regions. The main edible part of this fruit is its flavourful and nutritious juice. The rest of the parts i.e. rind and seed make upto 60% of the total weight of fruit and are disposed directly without any treatment. Thus, the present work aims to explore the antioxidant potential of these two varieties of passion fruit (yellow and purple passion fruit) from Northeast India for various applications. The entire thesis work has been divided into four major parts. The first part of the thesis presents the collection, morphological and physico-chemical characterization of the rind and seed of yellow passion fruit and purple passion fruit collected from Northeast India. The second part of the thesis discusses the phytochemical profile of the rind and seed extracts from yellow and purple passion fruit and their role as antioxidant and antibacterial agents. In this context, the samples were extracted using four different solvents such as ethyl acetate, acetone, methanol and water. Phytochemical mining study revealed presence of many phytochemicals from the passion fruit sample. Further, in the subsequent part of the thesis, role of the antioxidant rich passion fruit extracts for increasing oxidation stability of different biodiesel was elaborated. Biodiesel is prone to oxidation because of high moisture content and unsaturated fatty acid composition.

However, natural antioxidants act on free radicals of biodiesel and delay the process of oxidation. In this context, the present work focused on to check the protective effect of different passion fruit extracts on three different synthesized biodiesels such as, Neem biodiesel, Karanja biodiesel and waste cooking oil biodiesel. Finally, the anti corrosion effects of different passion fruit extracts were checked on mild steel submerged in various biodiesel mediums. As mentioned in above, moisture and unsaturated fatty acids present in the biodiesel speed up the oxidation process which further makes biodiesel corrosive. Due to the metal leaching process, metal starts forming sediment on the bottom of biodiesel tank and further deteriorates its quality. Therefore, in this context, the anticorrosion properties of different passion fruit extracts were checked via weight loss method.

