INTRODUCTION

Agricultural waste is one among the biomass that attracts the renewable energy resource, because it is dispersed widely and gives zero net CO_2 emission to the atmosphere. Every aspect of today's life depends on coal, petroleum, gasoline or valuable chemicals. The accelerated increase of the world's population demands for the increase in fuel day by day. Various solid biomass fuels such as lignite, coal, wood, peat and paper are available for gasification. In India, the availability of biomass is nearly 500 million tons per annum that includes forestry and agriculture residues (Anilkumar *et al*., 2015). Bioenergy is an essential feature of emission of greenhouse gases and used as a substitute for the fossil fuels. The increase of population and industrialization leads to the continuous increase of energy needs (Goldemberg, 2000). Agricultural residues in high quantities resulted from the cultivation of crops were a significant source of energy supply in rural areas for domestic activities. The residues from agriculture are either burnt in open or inefficiently used. The conversion process of "waste-to-energy" is reliable on heat and power generation for fuel production. It has marked potential and good economic value in the rural community and widely used in Austria, Canada, Denmark, Finland, Netherland, Sweden and USA (Mossialos *et al*., 2004).

Biomass is the primary source of energy that is produced in large scale and contributes to sustainable development of economic, environmental and social sectors (Kulkarni *et al*., 2006). Specific biomass wastes undergo anaerobic digestion and fermentation that yields oils and sugars. Also, thermal processing of biomass by pyrolysis method could yield oil. The energy and cost of drying represents a marked reduction in the efficiency during the pyrolysis process. Various thermal processing techniques are available for the agricultural biomass wastes with low water content (<15%) for regular operation. For the selection of energy conversion procedure, the critical and main criteria are moisture content. Thermal conversion process requires biomass fuels with less moisture content (Kendry, 2002).

Agricultural wastes are the most essential sources of biomass fuels for both the industry and domestic sectors. The primary residue available for energy is moderate and utilized as animal feed and fertilizer. Secondary residues for the processing site

were usually available in large quantities to handle and transport. The energy stored in agricultural waste is converted into useful forms of energy by using a wide range of thermal processes. The principal techniques of thermal conversions are pyrolysis a method undergoes in the absence of air, gasification in the limited air and combustion in excess air. Initially, feedstock agricultural wastes gasification took place in a restricted supply of O_2 and through devolatilization of the biomass. Volatile material, char combustion and reduction of biomass that is abundant in CO and H while producing the fuel gas. The obtained combustible fuel gas has less calorific value than the natural gas, but it can be used as fuel for boilers, combustion turbines and engines (Vineet *et al*., 2016).

The concept for the production of biofuel is not a new one. Rudolph Diesel was the one who used vegetable oil (Peanut oil) in a diesel engine for the first time in 1911 (Akoh *et al*., 2007; Antczak *et al*., 2009) to replace the conventional fossil fuels. The biofuel is noticed to reduce global warming that takes place by reducing CO_2, sulfur and hydrocarbon emissions (Fjerbaek *et al*., 2009). The bio-oil is a combination of about 300 varieties of minor and major components that belong to acids, alcohols, aldehydes, ethers, esters, furans, ketones, phenols, sugars, nitrogen compounds and multifunctional compounds. Bio-oil a clean fuel with CO_2/GHG (Greenhouse Gases) neutral emission has many environmental benefits over fossil fuels that generate the CO_2 credits. Plant biomass provides insignificant amounts of sulfur and does not generate the emissions of NO and SO_2. Bio-oil fuel generates less NO_2 emissions than diesel oil in a gas turbine. During pyrolysis agricultural residues are transformed into a combination of liquid bio-oil, solid char and gas (Fagernas, 1995). Bio-oil can perform as a liquid fuel or as a feedstock in the production of chemicals. A wide range of techniques involved in the bio-oil production includes ablative pyrolysis, flow reactors, fluid bed reactors, rotating cone reactors and vacuum pyrolysis. Recently, the utilization of agricultural waste is perusing more attention to produce natural product. These are comparatively cheaper, effective and best remedy for the disposal of wastes.

Fats and oils are termed triglycerides because the esters are composed of three fatty acids are esterified to glycerol and not to form glycerol. In the glycerol molecule, all the three OH groups esterifies with the same fatty acid and the resulting ester

known as a simple triglyceride. Naturally occurring fats and oils possesses two or three different fatty acid components and called as a mixed triglyceride (Clifford, 2018).

A triglyceride is termed as fat if it is solid at 25^{o}C and is called as oil if it is a liquid. The melting point differs in the degree of unsaturation and the carbon atom numbers in fatty acid constituents. Triglycerides are obtained from animal sources while the oils are generally obtained from plants. The composition of fat or oil varies depending upon the plant or animal it originates from and also changes on climatic and dietic factors. The most abundant saturated fatty acid is palmitic acid and the highest unsaturated fatty acid is oleic acid. The high consumption of saturated fat increases the cholesterol to a high level and escalates the risk of heart disease (Berg and Jeremy, 1996). Biofuel is produced through biological processes during agriculture and anaerobic digestion whereas the fossil fuels are produced by geological processes from prehistoric biological matter. Biofuels can be obtained directly from the plants, especially energy crops or indirectly from the agricultural, commercial, domestic and industrial wastes.

Contemporary carbon fixation involved in renewable biofuel occurs in plants or microalgae through the photosynthesis process (Madhumanti *et al*., 2017). Worldwide biofuel production reached up to 105 billion litres in 2010, 17% increase from 2009 and 2.7% of the world's fuel used for road transport was provided by the biofuels (Shalaby, 2013). In 2010, global ethanol fuel production reached 86 billion litres and 90% of global production was in Brazil and the United States. European Union is the world's largest biodiesel producer accounting for 53% of all biodiesel production in 2010. In 2011 blending biofuels become mandatory in 31 countries and 29 states (Ren, 2011). The International Energy Agency aims to supply biofuels to more than a quarter of world transportation fuel demands by 2050 and minimize the dependence on coal and petroleum. The biofuel production also leads to the flourishing of automobile industry and 79% of cars manufactured in Brazil are using a hybrid fuel system of bioethanol and gasoline (Jeremy *et al*., 2011).

First generation biofuels produced by the conversion of grown food crops into ethanol or biodiesel using various processes includes transesterification, fermentation by yeast, blending vegetable oils with fossil fuels or using vegetable oils in an engine

(Ewing and Msangi, 2009). Second generation biofuels produced from marginal croplands that are unsuitable for the production of food or in other words, using non-food crops and residues. Cellulosic ethanol technique used to produce biofuels such as *Jatropha* - based biofuels. Fischer- Tropsch and some other biomass gasification technologies applied industries include Blue fire, BP Biofuels, Coskata, Cobalt technologies, DuPont Danisco, Gevo, KL Energy, Lignol, Qteros, POET, Rentech, Virent and Zeachem. This type of biofuel has a broader selection of geographies due to more availability and less controversies (Service, 2007; Ramirez, 2015). Third generation biofuels that are land-based and made by using non-arable land with the integration of technologies that leads to the production of fuel from feedstock by biomass destruction. Many algae-based industries namely, Sapphire Energy fit, Solazyme and Solix produce this type of third generation biofuels. It can be produced anywhere when CO_2 and H_2O found in sufficient concentration (Teixeira, 2012). Fourth generation biofuels produced using non-arable land and don't require the biomass destruction. Amyris, Algenol, Joule Unlimited, LS9 and Naturally Scientific are some of the companies involved in the production of this kind of biofuels. The preparation of biofuels is less controversial and not harmful to the biodiversity and environment. This kind of biofuels includes electro fuels and photo biological solar fuels (Aro, 2016).

Depending on the production of biofuel the environment is benefitted. As a renewable source of energy, plant-based biofuels make a small contribution to climatic change and global warming; a significant greenhouse gas CO_2 enters the air during the process of combustion will be removed from the air by growing plants that photosynthesis and known to be carbon neutral and beneficial. The proper way to produce biofuel to serve all requirements simultaneously will continue to experimentation and debate, but biofuel production is likely to continue its fast growth. In 2007, Energy Independence and Security Act of the United States directed the use of 136 billion litres of biofuels annually by 2022. The legislative also stated with certain stipulations regarding 79 billion litres of the total quantity of biofuel other than corn-based ethanol, continues to get certain government subsidies and tax incentives for the production of biofuel (Leighton, 2014).

Biofuel has a distinctive promise that, in association with a flourished technology to carbon capture and storage and the process of manufacturing and using biofuels may be sufficient in reducing CO_2 from the atmosphere. The captured CO_2 could be stored or sequestered in long-term repositories such as geologic formations in the land, in the sediments of deep ocean or conceivably as solids like carbonates.

From the ancient days, traditional medicinal plants were proven to possess biological properties as analgesics, anticancer, antipyrexial, antimicrobial and antihypertensive activity. During the 2000 years, a large population of the world extensively used medicinal plants for their health care and got remedy against the diseases. This information resulted in a vast degree of correlation between the use of traditional medicinal plants and laboratory assays (Kumar and Roy, 1972). Phytotherapy mainly focused on the biologically active compounds present in plants. (Garza *et al*., 2007; Hostettman, 1998). Now a day's various studies investigate plants as a significant source for preparing medicines (Locher *et al*., 1995). *Staphylococcus aureus* becomes resistant to commonly used antibiotic due to indiscriminate use of antibiotics. *Staphylococcus* resistance to penicillin, is mediated by penicillinase, a form of β- lactamase production. The first report on *S. aureus* resistance to penicillin was published in 1945, concluding its combination with the enzyme penicillinase produced by the bacteria (Sprink and Ferris, 1945).

Staphylococcus aureus is an opportunistic bacterial pathogen that causes a wide range of clinical infections. The causative pathogen reflects the diversity of virulence factors on the diseases. *S. aureus* established infection in the host by an inclusive pair of virulence factors such as adhesions, enzymes, toxins and other surface proteins that permit the pathogen to survive under extreme conditions. It also resist arsenal of antibiotics and leads to dissemination of many multidrug resistances. The antivirulence therapeutics is developed by neutralizing or blocking the pathway to regulate the production of toxins by the bacteria thereby controlling antibiotic resistance (Kong *et al*., 2016). Drug resistance to human pathogenic bacteria is reported in recent years from all over the world (Piddock and Wise, 1989). Indiscriminate usage of antibiotics is alarming in developing countries and as well as in developed countries (Ahamad and Beg, 2001).

Skin infections were widely seen in the tropics with many orthodox remedies involved as alternate for systemic antibiotics, their problems due to drug resistance and allergies also reported. Coconut oil confirmed to possess antibacterial, antifungal, antiviral and antiprotozoal properties (Isaccs and Thormar, 1991). The phytochemical analysis resulted that lauric acid is one of the major fatty acids responsible for the activities of the oil (Peat, 2003). Obi *et al*., (2005) reported the antimicrobial properties of coconut oil and the recent attempt to study its formulation into creams. A limited number of antimicrobial agents were widespread among drugs that have antimicrobial properties and led to the preparation of resistant drugs for microbial infections (Alexander and Perfect, 1997). The abnormal production of free radicals leads to the increase of oxidative stress on the cellular structures and it changes the molecular pathways that cause important non-pathogenic diseases including cardiovascular, cancer, physiological aging and neurological diseases.

In India, different parts of several medicinal plants were used to cure some specific diseases that have been known from ancient times. The indigenous system of medicine namely Ayurvedha, Unani, Siddha and Homeopathy (AYUSH) have been in existence for centuries. A large number of chemicals from the plants formulate different types of drugs. Thus, the plants have given the blueprints for modern medicine (Prasad, 2002). Grounded coconut shell powder was used as activated carbon, charcoal and synthetic resin filter. During World War II, the coconut water used in emergencies by directly injecting into the patients veins. In ancient times, coconut used as an effective remedy for all kinds of intestinal worms. Arivalagan *et al*., (2018) stated that coconut haustorium has carbohydrates, ash, starch, proteins, fats and soluble sugars. It also contains a considerable quantity of dietary fibre, mineral nutrients namely Ca, Cu, Fe, K, Mg, Mn, P and Zn. It is rich in the phenolic source with high antioxidant activity. It can be used in the formulations of baby food for those affected by the intolerance of lactose. In the United States, coconut oil is considered one of the primary sources of dietary fats in the mid-1940s, aside from animal and dairy fats before the American edible oils soybean and corn industry has taken over. Virgin coconut oil is non- toxic to humans, and considered as the "drugstore in a bottle." The coconut has religious connotations in India as "the fruit of aspiration" and offered to the Gods to begin many new rituals (Tarun *et al*., 2015).

Cancer is one of the severe common diseases with high mortality worldwide. Treatment of cancer is not sufficient to lower the risk of annual death rates, but there is an urge to find new strategies to control cancer cells. The healthy cells change to cancer cells due to the alteration of genes that control the growth and differentiation of cells (Priya *et al*., 2013). US Natural Cancer Institute recognized natural products usage, identification and preparation of anticancer drugs (Cragg and Newmann, 2005). Medicinal plants possess alkaloid, flavonoid, phenol, saponin and terpenoid compounds that posses therapeutic activities against the formation of cancer (Latif *et al*., 2014). Increase in the consumption of vegetables and fruits in our daily diet have the potential as chemopreventive agents to prevent cancer cell growth. Cancer is a multistep disease which incorporates chemical, environmental, genetic and physical factors. The damage of DNA develops cancer cells. Approximately 100 various forms of cancer were reported, 12.7 million new cancer cases reported every year and deaths over 7 million every year in the developing countries. In the 20^{th} century, cancer was the most dreaded disease and spreading continuously and increased more in the 21^{st} century. Every year 6.7 million people worldwide were dying from cancer (Watson *et al*., 2000).

Cancer development is considered as an impact of life style changes and modernization of socio-cultural life ruled over by the chemical synthetic medicines (Preetha *et al*, 2008). Various studies focus on herbs under multiple of ethnobotanical values. National Cancer Institute collected approximately 35,000 plant samples from 20 different countries and screened nearly 1,14,000 extracts for anticancer activity (Shoeb, 2006). Breast cancer considered the most recurring disease worldwide and diagnosed as deadliest disease next to lung cancer with a massive number of mortality in females. This disease considered as an uncontrolled growth of cells starts from the breast tissue. According to the National Institute of health, about one in eight women in the United States are affected by this disease in their lifetime. After skin cancer, it is the second most common cancer in women, in 2014, approximately 2,33,000 women diagnosed with this disease at 55 to 64 age group (Benson and Jatoi, 2012). It was accounted for approximately 1.6 million new cases in 2010 at global level. The increased risk of breast cancer linked with the high level of estrogen, which mediates its biological effects such as cell apoptosis, genesis, malignant progression and binding of Estrogen Receptor were found in the breast cancer cells (Thomas and Gustafson, 2012).

In India, breast cancer is a severe health problem with the highest mortality rate in women. The prevalence of death rate due to breast cancer in India is more than 50, 000 every year. It occurs due to an uncontrolled division of cells that metastasize to the nearest parts of the human body. Interactions with α-Estrogen Receptor (ER) are responsible for causing malignant tumors and regulation of various genes during transcription. Most of the drugs used to treat breast cancer produce side effects (Suganya *et al*., 2014). The Estrogen Receptor alpha (α) and Estrogen Receptor beta (β) are the two primary forms exists in the Estrogen Receptor. Estrogen Receptor α is present in the liver, pituitary gland, mammary gland, vagina and uterus (Waraphan *et al*., 2011). Abnormal expression of Estrogen Receptor – α is responsible for causing 70% of the primary breast cancer patients (Dickson and Stancel, 2000). The Estrogen Receptor – α plays a significant role in controlling nuclear DNA transcription for the development of mammary gland and essential factor for breast cancer signaling network (Pantea *et al*., 2012). Estrogen Receptor inhibition has become necessary in the prevention and also to treat breast cancer (Salih and Fentiman, 2001).

Breast cancer is treated using Tamoxifene, Raloxifene and Toremifene drugs (Fabian and Kimler, 2001). Ingestion of these drugs works by interface with estrogen production or action and cause various side effects such as blood clots, cataracts, strokes and uterine cancer (Andrew *et al*., 2011). It is necessary to make new improved drugs to avoid side effects: an alternative and traditional approach to discover new drug compound from the natural flavonoid compounds known to possess anti-breast cancer activity and leaves without any side effects to the normal human cells (Kawaii *et al*., 1999).

Computational biology and bioinformatics contribute many areas related to life sciences and their impact on translational medicine grows with the scientific approach and has an essential role in clinically related studies. They have potential on speeding up the process of drug discovery at the same time it reduces the cost of drugs. The orientation of the preferred molecule predicted by a method called molecular docking binds each other to form a stable complex. Binding orientation between the small molecules with their macromolecule ensures to provide the affinity of the provided target protein. Molecular docking is an essential tool for the discovery

of drugs. Selection of a flexible receptor is a challenge for present day molecular docking methods (Meng *et al*.,2011).

Human genome project completion leads to an increased number of new therapeutic targets for the discovery of drugs. Crystallography, protein purification and nuclear magnetic resonance spectroscopy methods have been developed and contributed to various structural details about proteins and protein-ligand complexes (Jorgensen, 2004; Kitchen *et al*., 2004). Virtual screening (VS) methods used for identification and optimization of various analytical methods (Gohlke and Klebe, 2002). Traditional experimental high-throughput screening (HTS) was compared with VS and was found that VS is a more direct and rational drug discovery approach with low cost and also the screening was effective (Moitessier *et al*., 2008; Bailey and Brown, 2001).

Molecular docking studies performed by developing molecular docking program based algorithms and it is an increasingly important tool in the pharmaceutical field (Halperin *et al*., 2002; Brooijmans and Kuntz, 2003). Various comparative studies were made to evaluate the relative program performance (Cross et *al*., 2009; Li *et al*., 2010). The molecular docking study was used to compare the interaction between small molecules with a binding protein molecule at the atomic level and elucidate the fundamental biochemical processes (McConkey *et al*., 2002). Limitations of computer resources were considered, as the docking studies performed with a rigid receptor and a flexible ligand for a long time, whereas now it is the most popular method used in drug discovery (Friesner *et al*., 2004; Morris *et al*., 1998). In docking studies, a challenging task is modeling the peptides which are relatively large sized molecules and highly flexible. Various methods are available for the efficient modeling of peptide flexibility during the docking of the protein-peptide bond (Ciemny *et al*., 2018).

Rational Drug Design (RDD) is used to facilitate and speed up the discovery of drugs, in which various methods are involved to identify the appropriate compounds. One such process is docking the drug molecule with the target molecules or receptors. In the process of action of a drug, the receptor is ultimately responsible for the pharmaceutical effect, so a simultaneous sample method is adopted for AutoDock 4 to deal with the flexibility of side chains of the receptor. The user can

select various receptor side chains and simultaneously sample with a ligand using the same procedure. During sampling, other portions of the receptors are treated with a grid energy map. Grid energy map is used to save receptor energy information and simplify the calculation of energy calculation between receptor and ligand (Goodford, 1985). Ligand confirmation is generated subsequently and docked in the absence of the receptor (Kearsley *et al*., 1994) or the presence of the receptor binding cavity or with complete rotational flexibility on each dihedral angle using fragment relied docking (Zsoldos *et al*., 2007).

Majority of anticancer drugs are of natural origin, thus natural products play an essential role in the development of novel treatment amenity for cancer. Natural products derived from the medicinal herbs, food sources and marine organisms were able to inhibit Epidermal Growth Factor Receptor (EGFR) signaling (Efferth, 2011; Sertel *et al*., 2010). EGFR play an important role in various signal transduction processes including apoptosis and cell proliferation. Majority of cancer including breast, lung, ovarian and brain tumor caused by the over expression and deregulation of EGFR transmembrane cell surface receptor and mutations of the EGFR kinase domain (Singh and Felix, 2014).

The interaction model and pharmacophore of EGFR inhibitors were derived and used to explain the different biological activities of these inhibitors. Moreover the docking results were validated by molecular dynamics. It provides useful information for designing effective drugs for the therapeutic treatment of EGFR- related cancer (Liao *et al*., 2011). The *neu* gene encodes protein HER2 similar to human EGFR (Coussens *et al*., 1985). The HER2 receptor plays a significantly essential role in the cell growth and differentiation process associated with the development of human cancers including breast, gastrointestinal tract and ovarian cancers (Klapper *et al*., 2000). Approximately 20 to 50 HER2 gene copies have been found in breast cancers (Kallioniemi *et al*., 1992). HER2 amplified breast cancers posses unique biological and clinical characterstics. They have increased sensitivity to cytotoxic agents such as doxorubicin, relative resistance to hormonal agents to metastasize the brain and viscera. (Gabos *et al*., 2006).

Heat shock proteins (HSPs) are molecular chaperones that play an important role in the folding of cellular proteins (Bukau *et al*., 2006). HSPs directly take part in

the cell survival (Tang *et al*., 2005). In carcinogenesis, HSPs play a major role in helping cells, (i) to escape tumor suppression pathway, (ii) in becoming treatment resistant, (iii) in progressing to an advanced stage of cancer and (iv) for facilitating metastasis (Calderwood and Ciocca, 2008). Breast cancer cells become resistant to stress stimuli through HSP90 over expression. Therefore, therapeutic chances in treating cancer can be devised by the pharmacological inhibition of these target cells (Zagouri *et al*., 2010).

Free fatty acid (FFA) receptors are the members of G-protein-coupled receptors. GPR 40 and GPCR 120 are some of the FFA receptors and activated through the binding of long and medium chain FFAs. Kaori *et al*., (2008) studied the effects of GPR120 and GPR40 on cell motility and growth in breast cancer cells positively regulated through the induction of GPR40 by the long term treatment with tamoxifen (TAM).

Gasoline is obtained from crude oil. In the automobile engines, lubricating oil is used to cool the machinery parts to ensure that all the moving parts are in good working condition. Oil is used in various products; examples are cosmetics, detergents, farm fertilizers, plastic goods, nylon clothing and even waxes for chewing gum (Winder, 1983). A group of countries join together to a band and control the rate of a product by limiting its supply termed as a cartel. In Geneva, the oil cartel met and termed as the Organization of Petroleum Exporting Countries (OPEC). Among the 13 countries, four from the oil-rich Persian Gulf. They are Saudi Arabia, the world's largest exporter of fuel; the Qatar, UAE and Kuwait. The remaining nine countries are Algeria and Libya in North Africa, Gabon and Nigeria in West Africa, Iran and Iraq in the Middle East, Indonesia in Asia, Equator and Venezuela in Latin America. Mexico is one of the world's maximum exporters of oil but not belong to OPEC (Production of crude oil, 2016).

The OPEC countries do not produce the entire world's oil, but they can set the guidelines for oil prices. Many countries, especially the economically weak countries that do not produce their oil, the increased price cause great hardships to them. Crude coil has many disadvantages and affects the atmosphere. While burning, it emits CO_2 greenhouse gases that lead to global warming. It spills on land and pollute the environment with odour and oil sediments. Oil spills disturb marine life by damaging

marine plants, birds and animals. It also lowers O_2 levels in water bodies. It causes acid rain, corrodes the metallic surfaces and kills plants and organisms in water. During the refining of oil, it releases toxic gases namely sulfur and dioxins into the environment and causes harm to human life and other organisms and not easily recycled. Oil exploration and extraction leave holes in the ground, it leaves irreplaceable and mostly left unfilled after relocation. Price of oil keeps varying and likely to run out shortly (Ribeiro *et al*., 2007).

The new alternative source for the manufacture of biodiesel can be derived from the agricultural wastes such as Coconut shell and husk. On pyrolysis method at 120℃ to 150℃ temperature coconut shell and husk produce liquid smoke. Under various conditions for the treatment of recovery of biochar and bio-oil along with their characterizations are described by Asadullah *et al*., (2007). The research was done by using coconut shell (2kg) as biomass that yields 600mL of bio-oil and coconut husk (2kg) of biomass input yield 435mL of bio-oil. For the production of these two biomass products the recorded temperature was 250^{o}C. The oil mixed with diesel and the dynamic and kinematic viscosity is found to be lesser than the standard values. Coconut shell powder is natural lignocellulosic source and has outstanding potential to be used as reinforcement for plastic.

Viscosity is an internal property of a fluid that resists to flow. It determines the fluidity of liquids; it is useful in petroleum production, refining and transportation. It varies inversely with temperature. It is also affected by pressure; high pressure causes the viscosity to increase and subsequently the load carrying capacity of the oil also increases. Kinematic viscosity is expressed in centistokes (cSt). Viscosity in centistokes is conventionally given at two standard temperatures: 40^{o}C and 100^{o}C.

According to ASTM (2018) the first standardized test in 1924, the flash point is the lowest temperature at which an ignition source causes the vapours of the engine to ignite under specified conditions. The oil flashes because a flammable mixture results when it is heated sufficiently, produce vapours to emerge and mix with O_2 in the air. Continued heating of the oil to 50^o-75^o F above the flash point temperature will cause the fire point to be reached.

Density is an intensive property of a substance that doesn't depend on the amount of substance. The density of a sample measured by measuring its mass and volume. Analytical balance is typically used to measure the mass by a précised instrument that relies on the force exerted by the sample due to its gravity. The measured density is the ratio of the measured mass to the volume indicated on the flask (JoVE, 2018). Most of the large scale biomass combustion systems produce heat, hot water or steam except biomass fuels containing relatively large amounts of moisture. Dry biomass burns at high temperatures with thermal efficiencies than wet biomass. Flame temperature is directly proportional to the amount of heat essential to evaporate the moisture contained in the biomass; the lower the moisture content, the lower the amount of energy required for the removal of H_2O and the higher the boiler efficiency (Alireza *et al*., 2014).

Another important parameter of a biofuel is the calorific value, which represents the quantity of heat transferred to the chamber during combustion and indicates the available energy in a biofuel (Demirbas, 2009). The higher the Gross calorific value, the greater the energy contained in the biofuel which is obtained experimentally using a bomb calorimeter.

The cetane number (CN) is a commonly used indicator to determine the diesel fuel ignition and the quality. It influences the combustion process and engine performance. It determines the readiness of the fuel to auto ignite when injected into the machine or engine (Bamghoye and Hansen, 2008). Various characterstics such as density, heating value are related to cetane number. CN is used as the parameter to determine the quality of biodiesel and directly proportionate to the fuel ignition in delay time in CI engines (Knothe *et al*., 2003).

Biomass based energy is a renewable energy resource which is necessary for a sustainable environment. It is ecofriendly and gives livelihood for the farmers. Agrowastes are energy rich biomass which when properly utilized solve the problems of energy crisis. Coconut and Cashewnut are produced in large quantities in our country and their shells are discarded. Cashew nut shell oil is used in various industries. Whereas coconut shell is discarded and at the most used as firewood. It also takes longer period for the biodegradation of both these shells. In the present

study effort is made to extract the oil and study its properties. Both the oil will be evaluated for their biological activity and for their biofuel efficacy.

Coconut shell is usually considered as waste material. The purpose of this study is to create awareness of the plant as a source of important bioactive compounds to treat cancer disease. The motivation of this research is simple and precise. Searching for a low cost at the sametime renewable replacement for fossil fuels is the need for today. As fossil fuels are depleting and the gases emitted by using fuels are environmentally unfriendly. Reusing high efficient and low-cost Coconut and Cashewnut shell waste to prepare biofuel as a process of recycling the waste and make the process of biofuel production fully environmental friendly. The main goal of this study is to bring the alternate usage of Coconut shell oil and Cashewnut shell oil to mitigate the world's serious problem posed by the depletion of petroleum and diesel reserves.