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Biochemical, Biotechnical Significance of Mustard and its Role in Agricultural Based Industries

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Abstract

Mustard plant has great importance in the fields of agricultural sciences due to its high demand and natural compounds to make it important crop used as a food or for industrial purposes, with the residual cake used for animal feed. Mustard plant is highly rich in essential amino acids and protein contents. The protein is 25-30 % that making it excellent source of food used as oil in industrial and commercial purposes. Mustard oil has a special fatty acid composition; it contains aboutoleic acid, linoleic, linolenic acid and erucic acid. Mustard plant is used as condiment all around the world due to its large scale cultivations and agricultural importance. Most of characteristics make them ideal plant used as food. Due to efficient production and cultivation, mustards used as potential source in biodiesel production for significant progressing in the fields of herbal medicines. Biodiesel production is easy way to reduce energy in different days through the action of mustard plant. Mustard pant can use as a source to remove the heavy metals in order to central the biological pollution. Mustard plant as natural booster of immunity promoter in over to increase the survival of the cells.

Keywords: Mustard, importance, agricultural aspects, medicinal, biological composition.

INTRODUCTION

Mustard plant is highly rich in essential amino acids and protein contents. The protein is 25-30 % that making it excellent source of food used as oil in industrial and commercial purposes [1, 2]. Mustard oil has a special fatty acid composition, it contains about 20–28% oleic acid, 10–12% linoleic, 9.0–9.5% linolenic acid, and 30–40% erucic acid, which is indigestible for human and animal organisms. It is used in the condiment production at the large scale [3].

Mustard plant is used as condiment all around the world due to its large scale cultivations and agricultural importance. It is present in three forms such as seeds that is used for the aroma and flavor and stored by mixing with the water for long periods of time. It is also used in the wine and vinegar by it paste to increase its value as food [4]. Mustard is used as medicinal plant because contains biochemical compounds that are used for the treatment of various diseases such as cancer, diabetes and inflammatory immune diseases. It is also used as a food all world the world because of its large scale sowing and production [5]. It is grown as a source of vegetable oil and is an important crop for this purpose in northern India, Pakistan, China, southern Russia, and Kazakhstan. The oil is used for food or for industrial purposes, with the residual cake used for animal feed [6].

Its seeds are used for the production of purified oil that can be used for the cooking and industrial production of compounds [7]. It has great importance for the in the fields of agricultural sciences due to its high demands and compounds that obtained from it due to high contents of vitamin C that boost the immune system. It also activates the natural killer cells to fight against the microbes as well as parasitic infections [8].

Mustard plant contains the compounds such as polyphenols, antioxidants that activate the system of oxidase peroxidase catalytic enzymes [9]. Antioxidants in mustard helped to fight against the free radicals by

capturing them at the cellular and molecular level. It depends upon the purity of mustard where it extracted in the right source. High purification leads to increased extraction of chemical compounds and hence increases the chances of extraction of different kinds of compounds. While on the other hand, poor purification leads to decreases extraction of chemical compounds and hence decreases he chances of extraction of different kinds of compounds [10].

It is also used as medicinal plant for the treatment of various diseases associated with the metabolism such as diabetes, proteins based disorders, and carbohydrate based inborn errors [11]. There is variety of bacterial and viral strains that enter into the human body and once damage the cells of the body if their concentrations increased because they can grow rapidly. They also leads to borne of diseases that might be lethal for the body. Antioxidants in the mustard plant activate the different kinds of enzymes such as catalase, peroxidase that worked against them by activating the immune cells [12].

Fig-1: Shows the morphological structure off mustard plant

There are different forms of mustard that are used as food and thus increasing the medicinal value by treating the infectious diseases. These forms are white and brown mustards. The brown type of mustard is recognized as French type mustard while on the other hand, while type of mustard as American paste. It is added in the foods to increase their value such as pickles and vinegar. Biotechnical industries manufactured the oil seeds of mustard every year [13].

There are different morphological and physiological characteristics of mustard plant that distinguish them from other plants due to its immense use in medical fields [14]. Most of characteristics make them ideal plant used as food. Mustard plants can reach 150 cm in height. The young stems and leaves are bristle, the stems are erect, the lower leaves are smaller, the edges are notched or teethed, the upper leaves are narrow-lanceolate, and the edges are not sparsely toothed or entire. Due to these characteristics, these mustard plant have botanical, ecological, agricultural imprints and its species are used for industrial purposes [15].

Mustard plant has multiple advantages of growing and sowing as compared to the other plans such s thirty days under the temperature range 20-25 °C. It also depends upon the certain factors such as constrains of water cultivated and constrains of fertilizers. Mustard plant is extremely useful as mother plant among the medicinal due to its action on the certain microbes to target them in different ways under cellular expression by releasing different types of molecular proteins [16, 17].

Table-1: Shows the biochemical compounds, characteristics feature of Mustard plant

Sr. No	Features compounds	Characteristics and action against disease	Mechanism of action	References
1	Antioxidants	These are playing important to treat cancer an	Cellular	[18]
2	Vitamins	These	Molecular	[19]
3	Minerals	To treat the zinc for diabetes	Biochemical	[20]
4	Phenolic	As anticancer	Cellular	[12]
5	Polyphenols	As antioxidant	Molecular	[8]
6	ketoconazole	Antifungal	Molecular	[19]
7	Other natural compounds	Anticancer, antifungal, anticancer	Cellular	[20]
8	Proteins based	To aviate the biochemically active proteins to transport the proteins based compounds to maintains cell membrane	Molecular	[21]
9	Lipids based	To transport the lipids based compounds to maintain the permeability of cell membrane		[22]

Mustard and its role in agricultural based industries

Due to efficient production and cultivation of mustards as potential source in Biodiesel production made significant progressing in the fields of agricultural sciences. Biodiesel production is easy way to reduce energy in different days through the action of mustard plant. Biofuel application can be impressive in fuel reductions and other important uses in different equipment's such as aerospace. It is prepared through the trans esterification from vegetable oils or animal

fats. Plant oils are more efficient in producing of energy as they are less complex as compared to the animal systems [23-27].

Application of Mustard in Microbial Bioremediation

Mustard pant can use as a source to remove the heavy metals in order to central the biological pollution [28]. Heavy metals such as nickel chromium, arsenic and cobalt can cause pollution in the environment by causing different diseases such as skin cancer, liver and metabolic diseases. Heavy metals can be removed from the soil through phytoremediation that particularly used to make intact friendly companion with plant. Bioremediation thus helpful in dual nature as it promote the growth of plant by increasing the growth of good soil microbes such as nitrogen fixation by reducing to concentrations of heavy metals. This type of remediation reproved to be useful as it cheap and low cost materials can be utilized to control the biological pollution [29-32].

Nutritional Aspects of Mustard as immunity booster

Mustard plant as a source of vitamin C to boost the cells of the immune system such as T, B lymphocytes and natural killer cells. These cells particularly bind to the particular area of antigen such as epitope to destroy their cells [33, 34]. Mustard plant as natural booster of immunity promoter in over to increase the survival of the cells. It depends upon on the concentrations of the pathogens specificity and their target. Higher the concentrations of the pathogens leads increase chances to attack on the cells of the immune system while on the other hand lower the concentrations of the pathogen's leads decrease chances to attack on the cells of the immune system while on the other. In this case, mustard as source of vitamin C destroys the pathogenic cells hence playing important role of survival of the immune cells [35-37].

Mustard plant is used as antioxidant to treat various diseases at the cellular and molecular level. These contain flavonoids and polyphenols that can act through series of reactions to activate the biosynthesis of compounds necessary for cellular metabolism. There are certain chemicals such as oxidants can cause serious mutations in the normal cells that lead to deficiency of oxygen and death of many cells. It also has multiple benefits to activate the enzymes such as biological and chemical that act through biochemically [38-40].

CONLCUSION

Mustard plant is used as medicinal to treat the variety of different disease such as cancer, diabetes. It is also used for the production of ideal, oils, used for bioremediation act source of antioxidants. Due to large scale cultivations and productions, it can be used as a potential source of biochemically active compounds to discover the new natural compounds that can be used to treat the cancer based diseases.

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