**TITLE: Biological and Antioxidant Properties of Lemon Grass.**

#  ABSTRACT

This dissertation undertook to check out the antioxidant activity in Cymbopogon citratus. Four extracts of the *Cymbopogon citratus* leaves were made in ethanol, ethyl acetate, methanol and chloroform. After that the threez activities are done on these extracts. The method used for checking the antioxidant activity of extracts was DPPH assay and ascorbic acid is used as standard in this activity. The results of this investigation showed that extracts of *Cymbopogon citratus* leaves showed different values of antioxidant activities in different extracts. Results showed that rise in concentration cause increase in the activity. Highest antioxidant activity was shown by methanol extract at the concentration of 400mg/ml whereas the lower value is shown by the ethanolic extract at concentration 25mg/mL.*Cymbopogon citratus* has a lot of properties and it also show several biological properties. It shows the activities against bacteria and pests. It is also used in cooking and for making tea because it has lot of health benefits. Many other scientists also worked to check the antioxidant activities.

#  INTRODUCTION

*Cymbopogon citratus* that is commonly known as lemon grass is a tall perennial grass consisting of almost 55 species present in the regions that has warm weather and thrive well in nearly countries found in tropics and subtropics (Cheel *et al*.,2005). Plants that have medicinal properties are greater source of compounds that have antimicrobial properties. These plants are the sources of new potential drugs. They may contain compounds that have antidiabetic, anti-inflammatory, antioxidant as well as antimicrobial activities (Arun & Singh, 2012).

Studies showed the antimicrobial activity of lemon grass. By using agar well method at three different concentrations, the dried and fresh lemon grass leaves extract in cold and hot water, and in different solvents such methanol and ethanol were checked for their effectiveness against fungi (Aspergillus niger) and against a plant pathogen (Colletotrichum musae). In Aspergillus niger, dried leaves extract in methanol showed higher range of zone of inhibition which is followed by fresh leaves extract in methanol. The range of zone of inhibition was much less in fresh leaves extracts in ethanol in Colletotrichum musae (Nyamath & Karthikeyan, 2018).

The present research was conducted to check out the effect of lemon grass oil on rheumatoid arthritis. 30 people who were suffering from rheumatoid arthritis were selected and they were advised to apply lemon grass oil for about 30 days. After every 2- or 3-days pain scale was recorded. The results showed that there was temperate change in the pain of the participants. When they apply lemon grass oil for further more days there was significant decrease in the pain (Meenapriya & Priya, 2017).

The aim of the research was to evaluate that how harvesting of lemon grass at three different maturity stages affects essential oil, Chemical composition and citral contents. With the help of randomized complete block design lemon grass were planted at the University Agriculture Park, University Putra Malaysia. With the help of GC-MS technique the essential oil, chemical composition and citral contents were checked after harvesting. From all three maturity stages about 65 compounds were identified. So citral contents and essential oil of lemon grass were greatly affected by maturity stages at harvest. Thus, proper level of maturity is essential to obtain the good quality of essential oil and to reduce the production cost of lemon grass. (Tajidin *et al*., 2012).

Lemon grass and lavender oil were analyzed to check their antioxidant properties and various phytoconstituents and to check the presence of tannins, glycosides, carbohydrates, terpenoids, quinines, phenol and steroids. To cure various ailments such as fungal and bacterial infections, hemorrhage, cardiac failure etc. these components can be used. The total phenolic contents present in oil were checked and results showed their anticancer and antioxidant properties. Scavenging action of essential oil of both species and their usefulness in regulating platelet’s function and controlling blood pressure were shown by nitric oxides assays (Oviya *et al*., 2016).

The study was conducted to check out the photochemical constituents and antimicrobial tendency of *Cymbopogon citratus* for some selected microorganism. The agar well diffusion and maceration technique were used in this study. Solvents such as ethanol, chloroform and acetone were used. Photochemical namely flavonoids, tannins, carbohydrates, alkaloids, steroids and Phyto-steroids were detected while glycosides and phenol were not present in acetone and chloroform leaf extracts. The results from preliminary photochemical screening of the leaf extracts indicated that presence of photochemical that might be used in medical processes. Lemongrass also showed the antimicrobial activity that can be used to control the activity of tested pathogens (Umar *et al*., 2016).

The study conducted to check the effects of different solvents and distilled water on the antioxidant activity and total phenolic contents in ginger, turmeric and lemon grass extracts. DPPH and FARP assay were used to check out the antioxidant activity and HPLC was used to check out the phenolic content’s quantity. Different extracts showed different values. Turmeric showed highest DPPH value. 80% acetone extract was excellent solvent for extraction of total phenolic contents. Number of phenolic contents in extracts depends on the type of solvent (Shabnam et al., 2018).

##  **OBJECTIVES**

1. To investigate the biological properties of lemon grass.

 2. To check out the antioxidant properties of lemon grass.

# MATERIALS AND METHODS

#  COLLECTION OF PLANT MATERIAL

Lemongrass (Cymbopogon citratus) leaves were collected from Kotli Azad Kashmir. The leaves were dried at room temperature without sunlight. After drying the leaves, they were grinded into fine powder.

##  PREPARATION OF EXTRACTS

The dried powder was brought to the laboratory and weighed. The weight of dried powder was 60mg. It was divided into four equal parts. The extracts of the plant were made by dissolving the powder form of *Cymbopogon citratus* leaves in different solvents. The solvents used for making extracts were ethanol, methanol, ethyl acetate and chloroform. 15mg of dried powder of lemon grass leaves was dissolved in 300ml of ethanol, 15mg in 300ml of methanol, 15mg in 300ml of ethyl acetate and 15mg in 300ml of chloroform. After mixing the mixtures they were covered with aluminum foil and placed at room temperature for seven days. The mixtures were shacked gently every day. After seven days all the four mixtures were filtered. The filtrate was kept open at room temperature for one month. After one month the solvents have been evaporated and extracts remained behind. The extracts were collected in small tubes for further activities.

##  ANALYSIS OF EXTRACTS

###  Antioxidant activity

The antioxidant activity was measure by using DPPH scavenging activity. For the preparation of DPPH solution dissolved the 0.00989g of DPPH in 100ml of ethanol. The solution was kept in dark so that light exposure is prevented. The diluted working solution of each extracts was prepared in ethanol. Different concentrations of extracts were also taken in each test tube and volume was made up to 2ml. The 0.5ml of DPPH was added in each test tube this mixture was shaken vigorously and placed in dark for 30 minutes to check the absorbance at 517nm. The solution that was prepared by mixing 2mg of each extract in ethanol was used to check the absorbance. Prepared the four solutions of ethanol extract, methanol extract, ethyl acetate extract and chloroform extract. For each sample DPPH is used as control and ascorbic acid is used as standard. First taken the 0.5mL of DPPH in test tube then different concentration of extracts was added. After placing in dark for 30-minute absorbance was checked at 517nm. This process is used for all four samples. The equation used to calculate the scavenging activity is DPPH scavenging ability (%)= 1- (absorbance of sample/Absorbance of control)×100.

# RESULTS AND DISCUSSION

## ANTIOXIDANT ACTIVITY

Antioxidant activity of four extracts (ethanol, methanol, ethyl acetate, chloroform) of *Cymbopogon citratus* is shown in table. The table clearly shows that different extracts have shown different range of scavenging activity. Scavenging activity increases with the increase in concentration. The Highest antioxidant activity is shown by methanol extract at a concentration of 400mg/ml and the lowest value is shown by methanol extract at a concentration of 25mg/ml.

####  Table-4.1: Antioxidant Activity

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No****.**  | **Concentration (mg/mL)** | **% Scavenging activity by leaves extract** | **Ascorbic acid** |
|  |  | **Ethanol**  | **Methanol**  | **Ethyl acetate**  | **Chloroform**  |  |
| 01  | 25  | 17  | 20  | 18  | 19  | 22  |
| 02  | 50  | 29  | 27  | 39  | 33  | 31  |
| 03  | 100  | 47  | 41  | 51  | 48  | 43  |
| 04  | 200  | 59  | 62  | 57  | 63  | 69  |
| 05  | 400  | 78  | 89  | 83  | 73  | 87  |

*Cymbopogon citratus* has a lot of properties and it also shows several biological properties. It shows the activities against bacteria and pests. It is also used in cooking and for making tea because it has lot of health benefits. Many other scientists also worked to check the antioxidant activities.

The antioxidant activity of *Cymbopogon citratus* is determined by using DPPH assay and using ascorbic acid as standard. DPPH assay is popularly used for checking the free radical scavenging activity. The purpose of the test is to check the ability of extracts to scavenge the stable free radical. The purple colour of the Solution turned into yellow colour in all four assessed extracts. At different concentrations the four extracts have shown different values. With the increase in concentration the percentage scavenging activity also increases.

The antioxidant activity was also checked in lemon grass and citronella oil by Jumepaeng *et al*., 2013. They used DPPH radical scavenging activity. The IC50 value of lemon grass and citronella was 4.73±0.15μL/mL and 0.46±0.012μL/mL respectively.

0

0

10

20

30

40

50

60

70

80

90

25

50

100

200

400

**%Scavenging**

**Concentrations**

**Free radical scavenging**

Ethanol

**Figure- 4.1: Free Radical Scavenging Activity Shown by Ethanol Extract of *Cymbopogon citratus* Leaves.**

0

10

20

30

40

50

60

70

80

90

100

25

50

100

200

400

**% scavenging**

**Concentration**

**Free radical scavenging**

Methanol

**Figure-4.2: Free Radical Scavenging Activity Shown by Methanol Extract of *Cymbopogon citratus* Leaves.**

0

10

20

30

40

50

60

70

80

90

25

50

100

200

400

s

**Concentration**

**Free radical scavenging**

Ethyl acetate

**Figure-4.3:Free Radical Scavenging Activity of Ethyl Acetate Extract of *Cymbopogon citratus* Leaves Extract.**

0

10

20

30

40

50

60

70

80

25

50

100

200

400

**% Scavenging**

**Concentration**

**Free radical scavenging**

Chloroform

**Figure- 4.4: Free Radical Scavenging Activity Shown by Chloroform Extract of *Cymbopogon citratus* Leaves.**

0

10

20

30

40

50

60

70

80

90

100

25

50

100

200

400

**% Scavenging**

**Concentration**

**Free radical scavenging**

Ascorbic acid

**Figure-4. 5: Free Radical Scavenging Activity Shown by Ascorbic Acid.**

# CONCLUSIONS AND RECOMMENDATIONS

Antioxidant activity of the samples can be checked out with the help of different techniques. From this investigation it come to know that *Cymbopogon citratus* has antioxidant effect. Many people now days like to use chemicals and drugs instead of natural products which is causing serious health damages. Naturally available products and their extracts have many beneficial properties. The antioxidant activity of *Cymbopogon citratus* shows that is very beneficial from medicinal point of view and is largely used by local population. This study showed that

*Cymbopogon citratus* has antioxidant activity which is useful in protecting humans from various pathogens. So, we can say that *Cymbopogon citratus* is very important from medicinal point of view. The free radical activity and reducing activity have shown that *Cymbopogon citratus* serve as excellent antioxidant agent. *Cymbopogon citratus* has wide range of health benefits. It helps us in protection from bacteria and yeast. It also contains substances that relieve us from pain and minimize the chances of fever. It is also helpful in stimulation of uterus and menstrual flow and have antioxidant properties.

So, it is better to use *Cymbopogon citratus* as a remedy in treatment of different ailments as it contains many substances that have beneficial properties. Instead of using harmful chemicals and different drugs natural remedies are better option for treatment of various diseases. So *Cymbopogon citratus* should be used as health remedy.

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