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Without continual growth and progress, such words as improvement, achievement and success have no meaning. We are delighted to introduce you to the fourth edition of the journal Carmel Bloom, a multidisciplinary research journal, published by Carmel Research Cell. The prime intent of this journal is to bring scholars and students from various disciplines together. It includes research articles from Botany, Sociology, History, English, Mathematics, and Commerce.

The success of any journal is built primarily on contributors, reviewers, the associate editor and the publication staff. We thank all of them for helping us to materialize Carmel Bloom.

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**PRELIMINARY PHYTOCHEMICAL ANALYSIS
AND COMPARATIVE ANTIMICROBIAL ACTIVITY
STUDY OF SELECTED MEDICINAL PLANTS AND
THEIR HERBAL OIL**

Jipcymol P. and Anagha M.S

Department of Botany

ABSTRACT

The present study was to investigate the phytochemical and antimicrobial profile of methanol and water extracts of fresh samples of the bark of *Cassia fistula* L., leaves of *Erythrina variegata* L., *Sennatoria*(L.) Roxb., and whole plant of *Cynodondactylon* (L.) Pers. A herbal oil was also prepared and screened for its antimicrobial activity. The phytochemical analysis of plants showed the presence of proteins, tannins, glycosides, saponins, alkaloids, steroids and flavonoids in *Cassia fistula* L. bark. Leaves of *Erythrina variegata* L. showed the presence of carbohydrates, proteins, tannins, glycosides, saponins and flavonoids. Leaves of *Sennatoria* (L.)Roxb. showed the presence of carbohydrates, proteins, flavonoids, tannins, glycosides, saponins and steroids. The whole plant of *Cynodondactylon* (L.) Pers. showed the presence of carbohydrates, proteins, alkaloids,

tannins, glycosides, saponins, proteins, alkaloids and flavonoids. The plant materials were tested for their inhibitory activity against skin pathogenic bacteria *Staphylococcus aureus* and the fungus *Candida Albicans*. The investigation helped to understand that the fresh methanol extract of *Cassia fistula* L. bark showed the maximum zone of inhibition against *Staphylococcus aureus* and *Candida albicans*. Leaves of *Erythrina variegata* L. and *Sennatoria* (L.)Roxb. showed good antibacterial activity. The whole plant of *Cynodondactylon* (L.) Pers. showed a minimum zone of inhibition against bacteria. Leaves of *Erythrina variegata* L. and *Sennatoria* (L.)Roxb. had good antifungal activity. *Cynodondactylon* (L.)Pers showed no zone of inhibition against *Candida albicans*. The prepared herbal oil had good antimicrobial activity, especially against skin pathogenic bacteria. Finally, the study concludes that all the experimental plants show considerable antimicrobial effect, in which the fresh bark extract of *Cassia fistula* L. shows maximum effect.

INTRODUCTION

Nowadays skin diseases are on the rise and the majority go after allopathic treatment and medicines. As a result of the continuous intake of these medicines, the germs get easily resistant to it gradually. A better way to cure such diseases is by the use of herbs that are easily available in our surroundings. These are of

less cost and free from side effects thus promising a better result and fine health.

Medicinal plants are an important part of our natural wealth. They serve as important therapeutic agents as well as valuable raw materials for manufacturing numerous traditional and modern medicines. The history of medicinal plants used for treating diseases and ailments probably dates back to the beginning of human civilization. Our forefathers were compelled to use any natural substance that they could find to ease their sufferings caused by acute and chronic illness. Since ancient times, plants with therapeutic properties have secured an important place in the healing practices and treatment of diseases.

In many countries, traditional medicine is still the mainstay of healthcare and most of the drugs and cures come from natural sources, such as plants. Even in developed countries, the raw material for manufacturing essential drugs is extracted from medicinal plants harnessing its natural properties of healing. Increasingly more people are turning to herbal remedies, especially for treating minor ailments.

Many drugs listed as conventional medications were originally derived from plants. Substances derived from plants remain the basis for a large proportion of the commercial medications used today for the treatment of heart diseases, high

blood pressure, pain, asthma, cancer and other problems. Plants contain several metabolites and only a small percentage of them have been investigated phytochemically. Natural products have been proven to be the richest source of medicinal compounds.

PLANT DESCRIPTION

1) *Erythrinavariegata* L.

Erythrinavariegata L. is a species of *Erythrina* belonging to the family *Fabaceae*. Native to the tropical and subtropical regions of Eastern Africa, the Indian subcontinent, Northern Australia and Islands of Indian Ocean and Western Pacific Ocean East to Fiji, *Erythrinavariegata* L is a thorny deciduous tree that grows to 27m tall. The leaves are pinnate 20cm long and have black seeds. Its barks and leaves are used in medicine. It is also used in Sidha medicines. Different parts of *Erythrinavariegata* L. have been used in traditional medicine as a nervine sedative. In some experiments, it has shown potential effects for the treatment of diseases like fever, inflammation, cough, etc.

2) *Cynodondactylon*(L.) Pers.

Cynodondactylon (L.) Pers. is a grass that originated in the Middle East. *Cynodondactylon* belongs to the family *Poaceae*. The grass blades are grey-green coloured and are short, usually 2-15cm long with rough edges. The erect stems can grow up to 1-30cm tall. The stems are slightly flattened, often tinged purple. It

has a deep root system. The seed heads are produced in a cluster of two to six spikes at the top of the stem. The whole plant is medicinal according to the Hindu medical God *Dhanwantari* who gave to the world the science of *Ayurveda*. It is sweet, palatable, cool and nutritious and is also used for the treatment of diabetes, urinary tract infections, blood disorders etc. In the Siddha system of medicine, *Karuka* grass is used to detoxify the body. It has been extensively used in traditional medicines to treat varied ailments such as cough, headache, diarrhoea, cramps, epilepsy, dropsy, dysentery, etc.

3) *Cassia fistula* L.

Cassia fistula L. known as the golden rain tree is a flowering plant in the family *Fabaceae*. The species are native to the Indian subcontinent and adjacent regions of South East Asia. The tree is medium-sized, growing up to 10-20m tall. The fruit is a legume. In *ayurvedic* medicine, the golden shower tree is known as ‘*aragvatha*’ meaning disease killer. The fruit pulp is considered a purgative.

4) *Sennatoria* (L.) Roxb.

Sennatoria (originally described by Linnaeus as *Cassia tora*) is a dicot legume in the subfamily *Caesalpinioideae*. It is an annual herb. The plant can grow up to 80- 90cm mostly with three opposite pairs that are obovate. The stems have distinct smelling foliage when young. The flowers occur in pairs in axils of leaves

with five petals and are yellow. The pod is sickle-shaped. The plants, as well as seeds, are edible.

ANTIMICROBIAL PROPERTY

An antimicrobial is an agent that kills microorganisms or inhibits their growth. Agents that kill microbes are called microbicidal, while those that merely inhibit their growth are called biostatic. Antibiotics have helped to extend expected life spans by changing the outcome of bacterial infection. They have played a pivotal role in achieving major advances in medicine and surgery. Antibiotics decrease the morbidity and mortality caused by foodborne and other poverty-related infections. Lee Ventola. C (2015).

TESTED MICROORGANISM

1) Staphylococcus aureus

Staphylococcus aureus is the most dangerous of many common Staphylococcal bacteria. These bacteria spread by having direct contact with an infected person, by using a contaminated object, by inhaling infected droplets dispersed by sneezing or coughing. Skin infections are common, but the bacteria can spread through the bloodstream and infect distant organs. Skin infections may cause blisters, abscesses, redness and swelling in the infected area.

The bacteria tend to infect the skin often causing abscesses. Nazzaro et al., (2013).

1) *Candida albicans*

Candida albicans (sometimes referred to as *monilia*) is a fungus that is normally present on the skin and in mucous membranes such as the vagina, mouth or rectum. The fungus also can travel through the bloodstream and affect the throat, intestines and heart valves. *Candida albicans* is one of the potentially harmful microorganisms. When an overgrowth of *Candida albicans* develops on the skin, an infection can occur. This condition is known as candidiasis of the skin or cutaneous candidiasis.

MATERIALS AND METHOD

PLANT MATERIALS

The plant parts used for this study are leaves of *Erythrina variegata* L., the whole plant of *Cynodon dactylon*, (L.) Pers., the bark of *Cassia fistula* L. and leaves of *Sennatoria* Linn, collected from Thumboor and identified.

PRELIMINARY PHYTOCHEMICAL SCREENING

Preparation of Fresh Plant Extract-

Fresh plant materials were collected and cleaned using distilled water and shade dried for 1 hour to remove the moisture. 5g of fresh material was weighed, chopped into fine pieces and ground in a laboratory mortar and pestle. Finely ground plant parts were mixed in 25ml of the solvent (methanol and distilled water) and incubated for 24 hours at room temperature. The extract was centrifuged at 5000 rpm at room temperature and the supernatant was collected.

Phytochemical Analysis

The qualitative analysis of carbohydrates, tannins, saponins, steroids, alkaloids, flavonoids, glycosides, proteins and terpenoids were analysed by standard methods.

ANTIMICROBIAL TEST

Test organisms:

The common skin pathogenic bacteria *Staphylococcus aureus* was procured from Polyclinic Thrissur. The pathogenic fungus *Candida albicans* was procured from Amala Medical hospital Thrissur.

Preparation of plant extract:

Extraction by mortar and pestle: 10 gm each of plant materials was weighed separately and crushed using mortar and pestle with 10ml of each solvent (methanol and distilled water). Then each of them was poured into test tubes, labelled and its mouthparts were covered to prevent evaporation.

Preparation of culture media for bacteria:

Culture media were prepared by dissolving 19.5gm of Mueller Hinton Agar (MHA) into 500ml of distilled water taken in a beaker. The MHA media were added to boiling water. Constant stirring was needed to avoid the formation of any clumps. Then it was transferred to a conical flask and plugged with a cotton plug for sterilization.

Preparation of culture media for fungus:

Potato Dextrose Agar (PDA) medium can be prepared by using water, potato, and dextrose and agar powder. Potato infusion can be made by boiling 200g of sliced potatoes in distilled water for 30 minutes and then strain the broth through Whatman filter paper. Distilled water is added such that the total volume of the suspension is 1 litre. 20 grams dextrose and 20 grams agar powder are then added to the boiling water; constant stirring was needed

to avoid the formation of any clumps. Then it was transferred to a conical flask and plugged with a cotton plug for sterilization.

Antimicrobial assay by agar well diffusion method:

Procedure

The autoclaved media were transferred aseptically into each sterilized Petri plate. The plates were left at room temperature in laminar airflow for solidification. Agar well was prepared with the help of sterilized micropipettes. Wells were labelled as ME, WA, and +ve for methanol sample, water sample and standard respectively. The culture suspensions from the broth were swabbed on the media using the streak method. Various plant extracts were carefully added to the wells in the labelled Petri plate and antibiotic standard discs were placed in the well for comparing antimicrobial activity. Each plate was wrapped with cello tape, and then plates were incubated at 37°C for 24 hours. The radius of zone of inhibition of tested microorganisms by various extracts was measured and compared with those observed with standard disc and the results were recorded simultaneously.

RESULT AND DISCUSSION

Phytochemical screening:

The presence and absence of primary phytochemicals viz., alkaloids, flavonoids, glycosides, steroids, phenols, tannins and saponins are confirmed in the laboratory tests. Some plant extracts

and phytochemicals are known to have antimicrobial properties, which could be of great importance in therapeutic treatments.

The phytochemical analysis conducted on fresh methanol and water extract of bark of *Cassia fistula* L. revealed the presence of proteins, steroids, flavonoids, glycosides, tannins, saponins and alkaloids, and the leaves of *Sennatoria* (L.) Roxb revealed the presence of carbohydrates, proteins, flavonoids, steroids, tannins, saponins, and glycosides. The phytochemical analysis of fresh methanol and water extract of *Erythrina variegata* L. leaves revealed the presence of carbohydrates, proteins, flavonoids, tannins, glycosides and saponins and the whole plant of *Cynodondactylon* (L.) Pers. revealed the presence of carbohydrates, flavonoids, proteins, tannins, glycosides, alkaloids and saponins.

Flavonoids are most commonly known for their antioxidant activity. They are modifiers that modify the body's reaction to allergens, viruses, and carcinogens. They show anti-inflammatory, antimicrobial and anticancer activity. The presence of alkaloids explains its anti-bacterial activity since this phytochemical is reported to have antibacterial activity. Tannins are reported to have various physiological effects like anti-irritant, antisecretolytic, antiphlogistic, antimicrobial and antiparasitic effects. Phytotherapeutically tannin-containing plants are used to

treat nonspecific diarrhoea, inflammations of mouth and throat and slightly injured skins.

<i>Sennatoria</i> (L.) Roxb leaves.		<i>Cassia</i> <i>fistula</i> (L.) bark		<i>Erythrina</i> <i>variegata</i> L. leaves.		<i>Cynodond</i> <i>actylon</i> (L.).		Phytochem icals
AE	ME	AE	ME	AE	ME	AE	ME	
+	+	-	-	+	+	+	+	Carbohydr ates
+	+	+	+	+	+	+	-	Proteins
+	-	-	+	-	-	-	-	Steroids
+	+	+	-	-	+	+	-	Flavonoids
+	+	+	+	+	+	+	+	Tannins
+	+	+	+	+	+	+	+	Glycosides
-	-	-	-	-	-	-	-	Terpenoids
+	+	+	+	+	+	+	+	Saponins
-	-	+	+	-	-	-	+	Alkaloids

The antimicrobial activity has been screened because of its great medicinal relevance. In recent years, infections have increased to a great extent and resistance against antibiotics has become an ever-increasing therapeutic problem. The present study was initiated because of the increasing resistance to antibiotics of many skin pathogens including bacteria and fungi. Plant extracts and compounds are of new interest as antiseptics and antimicrobial agents in dermatology. As a result, the antimicrobial activity of

different medicinal plant part extracts of four plants was screened against the common skin pathogens.

Two solvent extracts from plants were investigated against human pathogenic bacteria *Staphylococcus aureus* and fungus *Candida albicans*. Fresh samples were used for the study. Sample herbal oil was prepared using the plant part which showed a maximum inhibitory effect, and its antimicrobial effect was tested. Methanol and distilled water were used as –ve control and gentamicin was used as +ve control for bacteria and fluconazole was used as +ve control for fungus.

Results show that the methanolic extracts of *Cassia fistula* L. leaf had a maximum zone of inhibition of 11 mm and water extract of *Cynodondactylon* (L.) Pers. had a minimum inhibitory effect of 1 mm. The zone of inhibition of fresh sample extracts against *Candida albicans*. Methanolic extract of *Cassia fistula* L. shows a high zone of inhibition 5 mm and water extract of *Sennatoria* (L.) Roxb and *Erythrina variegata* L. shows a minimum inhibitory zone of 2 mm. Fresh extracts of *Cynodondactylon* (L.) Pers showed no zone of inhibition. Sample herbal oil showed high antibacterial activity against *Staphylococcus aureus* and it showed only a minimum zone of inhibition against *Candida albicans*. Results declare that sample herbal oil has a good antimicrobial effect against *Staphylococcus aureus* and *Candida albicans*. In all the experiments, distilled water and methanol show zero zone of

inhibition and gentamicin shows an inhibitory zone of varying length of 8mm to 9mm and fluconazole showed inhibition zone of 10 mm to 11 mm.

Antifungal activity of fresh extracts against *Candida albicans*:

Inhibition zone					Sample	SL
Fluconazole	Water	Methanol	AE	ME		NO
11mm	0mm	0mm	2mm	3mm	<i>Erythrina variegata</i> leaves	1
10mm	0mm	0mm	5mm	5mm	<i>Cassia fistula</i> bark	2
11mm	0mm	0mm	2mm	3mm	<i>Cassia tora</i> leaves	3
10mm	0mm	0mm	No zone	No zone	<i>Cynodonda ctylon</i> whole plant	4

Antibacterial activity of fresh extracts against *Staphylococcus aureus*:

Inhibition zone					Sample	SL NO
Genta micin	Water	Meth anol	AE	ME		
9mm	0mm	0mm	4mm	5mm	<i>Erythrina variegata</i> leaves	1
9mm	0mm	0mm	10mm	11m m	<i>Cassia fistula</i> bark	2
8mm	0mm	0mm	5mm	5mm	<i>Cassia tora</i> leaves	3
9mm	0mm	0mm	1mm	4mm	<i>Cynodond actylon</i> whole plant	4

Antibacterial activity of herbal oil against *Staphylococcus aureus* and *Candida albicans*:

Zone of inhibition (in mm)	Sample	Test Organisms
10mm	Herbal oil	<i>Staphylococcus aureus</i>
10mm	Gentamicin	
5mm	Herbal oil	<i>Candida albicans</i>
10mm	Fluconazole	

Sample herbal oil was also prepared using the tested plant part which showed a high antimicrobial effect and its antimicrobial effect was studied against the tested pathogens. This helped to understand that herbal oil of *Cassia fistula* L. bark exhibits a high antibacterial effect as compared to the antifungal effect. The oil shows better inhibition against *Staphylococcus aureus* than *Candida albicans*. All the tested plants showed considerable antimicrobial activity. The bark of *Cassia fistula* L. showed maximum antibacterial effect which was even more than the antibacterial effect of antibiotic gentamicin. There exists a wide scope for these plants in the production of drugs for curing skin disease. Further studies of these plants will be beneficial in developing better medicines.

Commercially available medicines are expensive and also have side effects. So, few plants were chosen to study its antimicrobial effect, which had a role in traditional *ayurvedic* skin treatment. Plant extracts have been used for thousands of years as pharmaceuticals, alternative medicine and natural therapies. They are potential sources of novel antimicrobial compounds. In vitro studies showed that the plant extracts inhibited microbial growth. The prepared sample herbal oil has a high antibacterial effect and it also exhibited some antifungal effects. The antibacterial effect of bark extract of *Cassia fistula L.* is higher than the standard antibiotic used. This shows that natural substances rule over chemicals.

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A SOCIOLOGICAL STUDY ON THE PROBLEMS OF ELDERLY IN EXTENDED FAMILIES

Anitha P.V.

Department of Sociology

ABSTRACT

The human environment is not only physical but also social and psychological. The problem of ageing also has its dimensions. In recent times, as a result of the changing circumstances, older people have become increasingly vulnerable to their natural disabilities and have been compelled to have recourse to societal organizations to solve their difficulties. The problems of human beings are intimately connected to the environment in which they live.

INTRODUCTION

Ageing is an inevitable and universal process. Some people accept old age gracefully and they are happy with their children. But the condition of the majority of the aged people evokes pity. In the contemporary age, the rate of old people is increasing and the process of decline during the last part of life becomes a problem not only for the person concerned but also for the close relatives and the society as a whole.

The concept of ageing refers to the progressive changes that take place in a cell, in an organ or the total organism over the passage of an entire lifetime, but the study of ageing is primarily concerned with the changes from maturity until death. “Ageing” is a broad one and can be studied under three types: Biological, Psychological and Socio-cultural. Biological ageing refers to bodily changes that occur in the latter part of the life of an individual. This includes greying of hair, loss of teeth and the admonishing of sight and audibility. Psychological ageing refers to the change that takes place in the nervous system and it consists of a general decline in the mental abilities that accompany old age. It encompasses the attitude and behaviour of others toward them. Social ageing refers to the changes in the individual’s changing circumstances as a member of family, community and society. The changes include completion of parental roles, retirement from work, reduced income, diseases and disability and need for support. Cultural ageing defines what behavioural changes mean to the individual and the way he makes internal and external adjustments to them.[1]

Ageing in India

In India, 7% of the total population is over the age of 60 years and many of them suffer from visual and hearing impairment, arthritis, dementia, Alzheimer’s disease and others may suffer from severe disabilities. According to an estimate,

nearly 40% of senior citizens living with their families are reportedly facing abuse of one kind or another, but only 1 in 6 cases comes to light.

The provisional Census 2011 figures indicate that the decade 2001-11 is the first decade in independent India to witness a reduction in both absolute and relative population growth. A demographic transition is well underway in India, though there are significant differences across states. Fertility rates have come down across the country, and several states such as Kerala, Tamil Nadu and Punjab have reached replacement levels of fertility. The problem of ageing populations and the rising ratio of dependents to earners will also become a feature of some other states, which are moving rapidly through a process of demographic transition to low birth rates and low death rates. It is expected that demographic ageing will be accompanied by a large population of the elderly living in poverty, or at the subsistence level, and will also remain illiterate. The increase in the number of elderly women will be more than men.[2] The demographic trends revealed that the population growth is more rapid among the older age groups in India.

A World Bank publication [May 2005] “Old-Age Income Support in the 21st Century –An International Perspective on Pension Systems and Reforms” points out, while the developed world got rich before its people started living longer, in developing

countries people are getting older before the countries have got rich. In the context of India, this is true and makes the issue of ageing very critical in India, population ageing is occurring at the same time as dramatic economic and social developments are transforming much of the country.

Economic development has been accompanied by increasing participation of females in the organized sector. Traditional family support systems are stressed by the rapidly changing socio-economic scenario. All of these changes have raised concerns about pressure and challenges for the health care systems for the elderly, for social services and existing pension systems. Responding to these challenges will be one of the most difficult tasks facing by the government in the first half of this century.

RESEARCH DESIGN AND OBJECTIVES

The study focuses on the changing socio-economic and familial circumstances and the impact on the elderly population with a special focus on the problems faced by them. This study adopted a descriptive research design and included 50 samples between the age group 60-80 by using a simple random sampling method. An equal number of males and females are included in the sample. Samples were collected from Vellangallur Panchayath. The two major objectives of the study are as follows:

- To analyze the problems faced by the elderly in extended families
- To examine the support system among elderly people

Ageing –Multidimensional Problem

Psychologists, sociologists and anthropologists are trying to solve the problem of ageing from their angles. A few studies [(Birren (1959), Tibbitts & Donshues (1962), Townsend (1971), Desai (1982), Rao (1975)] have highlighted the family social roles and physical and psychological aspects of ageing. For the study purpose, social scientists, watched the different dimensions of the ageing problem. If we try to analyze the problem of ageing, we must analyze it, through different dimensions such as biological or health, psychological, economic and social.

Health Problems

Old age is a process; no one can escape from it. According to W.H.O, “Health is a state of complete physical, mental and social wellbeing and not merely absence of disease of infirmity” (P.K.B. Nair, 1989). The process of ageing brings with the reality of dependence on others for many daily needs and an awareness of the indignities that can accompany the loss of health and independence. Old age in itself is not a disease. Many ailments come to the surface as age advances. They may be of recent origin

or carried over from the past. It is accentuated by an increasing number of physical handicaps more frequent and serious illness, more mental disturbance and a general reaction among the aged that ill-health is their major burden. Moreover, the aged respond to habits rather than adjust habits to the environment. They live by habits. This is a major cause of health problems.

Physical Problems

Diseases	Some times		Always		Never		Total
	F	%	F	%	F	%	
Hyper tension	3	6	26	52	21	42	50(100)
Arthritis	46	92	4	6	-	-	50(100)
Diabetics	3	6	24	48	23	46	50(100)
Ulcer	-	-	6	10	44	88	50(100)
Hearing impairment	-	-	5	2	45	90	50(100)
Any other	1	2	1	2	48	96	50(100)

This table shows the physical problems faced by the respondent. It has been found out that 26 per cent of the respondents are always facing hypertension and 92 percentage of respondents have the problem of Arthritis. 24 percentage of the respondents have Diabetics and 6 percentage of them have the

problem of ulcers. 2 percentage of respondents have the problem of Hearing impairment. 8 percentage of the respondents have the problem of Stroke. 2 percentage of respondents are always facing some other kind of physical problem. Through this analysis, the researcher also concluded that the majority of the respondents are facing Hypertension and arthritis.

Psychological Problems

The problems may become worse if the aged are physically and/or economically dependent upon others. These factors affect adversely their psychological makeup and attitude towards life. The psychological age is characterized generally by a decline in the mental ability of the elderly. Individual worth, attitudes and behaviour play significant roles in the process of psychological ageing. Awareness of ageing sometimes shakes the person's self-confidence. The old memories, major achievements in life and the respect bestowed on a person renew his faith in his competence even in old age. They are separated from society and they believe that they are 'unwanted'. This feeling changes them into a stranger to their family, society and all living circumstances. An old person, who is economically and physically dependent on others, is led to feel insecure.

Psychological Problems of Elderly

Psychological problems	Never		Sometimes		Always		Not responded		Total
	F	%	F	%	F	%	F	%	
Feeling tired	26	52	7	14	9	18	8	16	50(100)
Loneliness	25	50	10	20	8	16	7	14	50(100)
Life meaningless	7	14	20	40	16	32	7	14	50(100)
Feeling unhappy	-	-	28	56	17	34	5	10	50(100)

The above table shows the psychological problems of elderly people. From the data, it is clear that more than half of the respondents are considering their life meaningless and unhappy. But 52 per cent of respondents opined that they are not feeling tired. It is a notable fact that a good number of respondents are not willing to share their problems.

Social Problems

Stereotypes about old age have a pronounced influence on social attitudes toward old age. And because most stereotypes are

unfavourable, social attitudes likewise tend to be unfavourable. The significance of unfavourable social attitudes toward the elderly is that it affects the way elderly people are treated. Old people are expected to adjust to decreasing strength and gradually failing health. This often means marked revisions in the role they have played in the home and outside. Meeting social and civic obligations is difficult for many older people as their health fails and their income is reduced. As a result, they are often forced to become socially inactive. Failing health and reduced income likewise require the establishment of new living arrangements which are often radically different from those of early years. Most old people must adjust to the death of a spouse.

Above the table shows the challenges faced by the respondents. While taking the level of emotional problems of elderly it can be summarise that 54 percentage of respondents always or frequently facing emotional problems and 18 percentage sometimes facing this. Economic problems of elderly are another area of concern. 84 percentage frequently have an economic problem. An equal number of 4 respondents marked that they do not face economic problems sometimes and never. In the case of physical problems, 54 percentage frequently facing such problems and 18 percentage sometimes face these.

Major Challenges of the Respondents

Challenges	Sometimes		Never		Frequently		Total
	F	%	F	%	F	%	
Emotional	9	18	14	28	27	54	50(100)
Economic	4	8	4	8	42	84	50(100)
Health	9	18	14	28	27	54	50(100)

Support System of Elderly People

The supporting system of the elderly is the second objective of this study. Family is the greatest single source of support and centre of activity for most elderly persons. The elderly people play a valuable role in the socialization of young children and in transmitting social and cultural heritage with the help of their vast experience.

Level of Interaction of the Respondents

Level of Interaction	Always		Rarely		Sometimes		Total
	F	%	F	%	F	%	
Partner	28	56	4	8	18	36	50(100)
Children	32	64	6	12	12	24	50(100)
Friends	17	34	9	18	24	48	50(100)
Relatives	22	44	8	16	20	40	50(100)
Neighbors	17	34	12	24	21	42	50(100)

The table focuses on the interaction circle of the elder population. Here the research analyzed the level of interaction among respondents to their partner, children, relatives and neighbours. While considering the interaction with partners 56 per cent of respondents agrees that always make a good interaction with their partners. 32 percentage respondents always interact with their children. 17 percentage of the respondents always keep interacting with their friends. 22 per cent of respondents are always trying to keep in touch with relatives. 17 percentage of respondents agree that they always interact with their neighbours. Findings reveal that 80 per cent of the elderly population prefers to live with their children.

CONCLUSION

The aged are affected by emptiness and loneliness which are responsible for their feeling of anxiety. Economic uncertainty, general unhappiness or distress, despair, meaninglessness and instability are other symptoms that indicate anxiety condition among the aged. The problem of ageing also has its dimensions. The physical and other problems will increase the rate of psychological problems, therefore all problems are interrelated. The demographic profile of the nation which reveals the alarming rate of increase in the elderly population should be taken into consideration by the planners and policymakers for developing a step in making the environment enabling and supportive of active ageing.

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A HISTORICAL STUDY ON THE ARCHITECTONICS OF PARAVUR SYNAGOGUE

Anu Kochumon

Department of History

ABSTRACT

Paravur Jewish synagogue was one of the cultural remains of the Jewish community. Paravur synagogue is one of the oldest Jewish synagogues in Kerala. This article discusses the architectural style of the Paravur Jewish synagogue, to understand the several elements of the Kerala tradition in the Paravur synagogue.

INTRODUCTION

The term Jew is derived from the Jewish word *Judah*. The Jews are descendants of ancient people called the Hebrews, by 200 AD.[1]Five communities constitute the Jewish presence in India: European, Baghdadi, Manipuri, Maratha, and Malayalee. The European Jews are those who migrated to big cities in India. Baghdadis are those who came to British India from the Middle East and Central Asia. The biggest Jewish community in India is

the Marati Jews who live in the Konkan region. They call themselves *Bene Israel* or the children of Israel.

The Jewish communities in Kerala were MalabariJews and ParadesiJews. MalabariJews are those who migrated centuries ago to Kodungallur, Pulloot and Paloorand gradually spread out in this area. ParadesiJews are those who came to Kochi from Europe during the colonial rule.

“By god’s grace, we
The Jews are going
to reach our eternal resting
place Israel
with pure wet eyes
we, can see Kerala
bidding farewell
to us, with its green
coconut leaves
your rulers are so
generous your people are
so hospitable!
we were rooted and
have grown in your soil”.[2]

This is a poem written by Malayalam poet Sri Vylopilli Sreedhara Menon on the occasion of the departure of Jews of Kerala. The poem reflects the long-drawn relations between the Jewish community and the Kerala society.[3]

It is not clear from which period Jews began to arrive in Kerala. Some believe that Jews came here more than a thousand years before the Christian era (*pothubarsham*). The peacocks, monkeys and ivory that were brought to Solomon's palace were from India [3]. The similarity of Hebrew words denoting these with that of Sanskrit and Tamil gives credence to this argument. Some believe that Hodu mentioned in the Bible refers to India. The Jews came to Kodungallur from Persia around BCE 52. According to the traditional belief of the Jews, some of those who become refugees when the second temple was destroyed in 70 CE came to Kodungallur [4]. Four Jewish names as witnesses are written in the Hebrew language in the Tarisapalli copper plate of 849CE.

Scholars generally agree that the earliest Jewish settlements in Kerala were in port cities like Kozhikode (Calicut), Kodungallor (Cranganore) and Kollam (Quilon). No record about their settlement at Kozhikode is available now, but it is evident from Tarisapalli copper plates that they had their guild of Anjuvannam at Kollam and that it was recognized by Ayyanattikal, the governor of Venad [5]. Benjamin Tudela and Marco Polo also

attested their presence. According to tradition among the Jews, their early settlements were at Palur, Pulloot, Maliankara and Madai. Palur or Palayur, as it is known today, is a few kilometers to the north of Kodungalloor near Triikkanamathilakam (North Mathilakam of today).[6] It was an important trade centre “resounding with the loud war anglings of deceitful merchants” (*Kokasandesam*, verse 48). The Zamorin annexed it and made it the headquarters of the southern command. He befriended the Arabs or the Moors who were the rivals of the Jew in trade. The unfriendly approaches very near to their settlement forced them to abandon it and move away to safer grounds.[7]

Place names like JoothaKunnu (Jews Hill), JoothaTheru (Jews Street) that persist indicate that once it was an important Jewish Centre.[8] Pullot is to the north of Kodungalloor. Once it was a ferry point known as *KavuKadavu* or Temple Ferry. Hence the Jews of these settlements came to be known as *Kadavumbhagam* (or “ferry-side”) Jews. Maliankara is one of the southern banks of Periyar near its estuary. It appears to have been an important Jewish settlement, as St. Thomas is said to have landed there in 52 AD. [9] It is also believed that in the 4th century, a fairly large number of Judeo- Christians (Jews converted to Christianity) under the leadership of K’nai Thomman or Thomas of Cana from Syria, disembarked and settled down at this place. But the most important was the settlement at Madai, originally

known as Moravel. It is described as “very ancient and well off and in it lives Moors and Gentiles and Jews; these Jews are of the language of the country; It is very long that they have dwelt in this place”. Today the place is called Methala. In its heyday, it was known as Shingly, especially among the Westerners. Shingly is the foreign seed version of Changala Azhi, the original name of the estuary at Kodungalloor. A part of the name survives as the place is called “Azhi” today. It was the hub of the activities of the Anjuvannam, the Jewish Merchant’s Guild.[10]

CONCLUSION

The Jews of Kerala whose existence in Malabar Coast has been traced to long before the Christian era. [11] In ancient times, Muziris was a renowned trading centre. Arabs, Jews, Romans, Greeks and Chinese came here. [12] The famed Muchiri mentioned in ancient Tamil epics, later became Muyirikode, Mahodayapuram, Kodunkaloor, Kodugallur. It was the *yavanas*-possibly Greeks- who gave the name Muziris to Muchiri, the illustrious port town which was situated somewhere along the coast of the Periyar river. In the torrent of time, all the insignias of glorious days of Muziris port were washed away [13].

The Jews are said to have landed first at Muziris or modern Cranganore in 70 AD. Some Jewish records preserved in the Regional Archives, Ernakulam reveal that due to the persecution

of the Portuguese they were forced to leave from Cranganore and settled at Cochin in 1513 AD. Then rulers of Cochin gave them lands to build their churches and synagogues in various parts of Cochin [14].

Jews came to Kerala as traders. Their important role in the trade history of Muziris is evident from the privileges accorded to them in the Jewish copper plate edicts. Jews too played a significant role in linking Kerala with Europe via Arab countries. They were also successful in agriculture when the English education system was introduced. Economically they were rich people. They owned acres of land not only in Paravur but also in Manjaly, Chowara and Aluva. Comparatively the Jews enjoyed a high standard of living. The Paravur Jews are closely related to each other. They are very orthodox in their religious belief. They are remaining only at Manjaly, a nearby place to Paravur. The evidence shows that Jews always maintained their own identities.

Paravur synagogue is one of the oldest Jewish synagogues in Kerala. It is not clear when this synagogue was first built, it is believed to be built in 1164. The stone on the walls stands testimony to the fact that it is renovated in 1616. Paravur Jewish synagogue museum represents the history and practices of Jews.

In the Paravur synagogue we can see the cultural blend between the Kerala architectural style and Jewish architectural

style. The use of wood and wood carvings is the main attraction of the Paravur synagogue. They used Kerala timber for the construction of the Paravur synagogue. Wood carvings in the Paravur synagogue were done by Kerala carpenters and it is an elegant work. The concept of *Padippura*, gatehouse, was adopted by Jews from Kerala tradition and was not seen in the synagogues constructed following their tradition. The corridor which connected the gatehouse to Azara was another notable feature that also indicates a Kerala connection. The wooden roofing in the Paravur synagogue is a special architectural feature. The centre raised roof is a common thing in Kerala. It is designed according to the climate of Kerala, especially the monsoon season. The small stone lamps on the walls, the gabled roof and ceilings worked without minarets are the main architectural style of Kerala. The wood-carved flower in the synagogue represents the national flower lotus. Another speciality of Paravur synagogue is the wooden carved *chavadi* or *charupadi*, a sloping seating support, seen mostly in traditional Kerala houses and the typical wooden gabled windows. So, we can see several elements of Kerala tradition in the Paravur synagogue. Thus, Paravur synagogue is a real example of the cultural blend of traditional Jewish synagogue architecture as well as Kerala architectural style.

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**A STUDY ON THE PERCEPTION OF
RETAILERS ON GOODS AND SERVICES TAX
WITH SPECIAL REFERENCE TO THRISSUR
DISTRICT**

Janitha N. P.

Department of Commerce

ABSTRACT

Goods and Services Tax is an indirect tax levied on the supply of goods and services. GST is said to be one of the revolutionary changes in the indirect tax system in India since independence. Its implementation has affected various sectors. For retailers, its implementation was expected to increase supply chain efficiency and facilitate seamless input tax credit. However, it is important to know their experience during the transition to GST. This experience would reveal whether there was any negative impact during the implementation of GST. Retailers are important for the economy as they account for 10% of GDP. Their comparisons with VAT and suggestions for improvements are valuable for the further modifications of GST.

Keywords: Goods and Services Act

INTRODUCTION

Tax is a fee charged by the government on a product, income or activity. If tax is levied directly on personal or corporate income, then it is a direct tax. If tax is levied on the price of a good or service, then it is called an indirect tax.

In India, the tradition of taxation has been in force from ancient times. It finds its references in many ancient books like *Manu Smriti* and *Arthasasthra*. The reform process of India's tax regime was started in 1986 by Vishwanath Pratap Singh, Finance Minister in Rajiv Gandhi's government, with the introduction of the Modified Value Added Tax (MODVAT). The journey of Goods and Services Tax began in the year 2000 when a committee was set up to draft GST law. It took 17 years from then for the law to evolve. The Goods and Services Tax Act was passed in Parliament on 29th March 2017. The Act came into effect on 1st July 2017. France is the first country in the world which has implemented GST in 1954.

Goods and Services Tax is an indirect tax levied on the supply of goods and services. GST law has replaced many indirect tax laws that previously existed in India. So, it replaced multiple cascading taxes levied by the central and state governments. The tax rates, rules and regulations are governed by the Goods and

Services Tax Council which comprises finance ministers of the centre and all the states.

The impact of GST on the retail sector will be very positive from both the taxation and operations points of view. Retail industries will have to re-assess their current supply chain strategy and re-model their network. First, the movement of goods would become less cumbersome, which opens gates for more suppliers/vendors to merge. Following this, a wider base of distributors would be available as state boundary paperwork will not be a hurdle, resulting in better access and low transportation costs. Simplified taxes and availability of input tax credits can also help fetch better margins.

REVIEW OF LITERATURE

Dr. R. Vasanthagopal (2011)¹ studied, “GST in India: A Big Leap in the Indirect Taxation System” and concluded that switching to seamless GST from the current complicated indirect tax system in India will be a positive step in the booming Indian economy. The success of GST will lead to its acceptance by more than 130 countries in the world and a new preferred form of the indirect tax system in Asia also.

Syed Mohd Ali Taqvi (2013)² studied, “Challenges and Opportunities of Goods and Services Tax in India” and explains that GST is the only indirect tax that directly affects all sectors and

sections of our country. It aims at creating a single, unified market that will benefit both corporate and the economy. He also explains that the proposed GST model will be implemented parallel by the central and state governments as Central GST and State GST respectively.

Neha and Manpreet Sharma (2014)³ describes GST in their research paper titled “A Study on Goods and Services Tax in India”. They tried to find out the benefits of GST and the current status of GST in India. According to them, we are moving towards GST due to faults in our current indirect tax structure. Our current indirect tax structure is unable to increase the competitiveness of industries. Both authors emphasize the benefits of GST.

Nitin Kumar (2014)⁴ studied, “Goods and Services Tax- A Way Forward” and concluded that implementation of GST in India would help in removing economic distortion by the current indirect tax system and is expected to encourage an unbiased tax structure that is indifferent to geographical locations

Pinki, Supriya Kamma and Richa Verma (2014)⁵ studied, “Goods and Services Tax- Panacea for Indirect Tax System in India” and concluded that the new NDA government in India is positive towards implementation of GST and it is beneficial for the Central government, State government and as

well as for consumers in the long run if its implementation is backed by strong IT infrastructure

Arpit Shailesh and Dr.Taruna (2016)⁶ in their study “A Study on Impact of Goods and Services Tax on Indian Economy: A Key Tax Reform” have stated that “GST in the Indian framework will lead to commercial benefits which were untouched by the VAT system and would essentially lead to economic development. Slowly, India shall move to join the worldwide Government in taxation, corporate laws and managerial practices and be among the leaders in these fields”

Bhavana Mukaria (2017)⁷ in her study “GST – Present and Future” has opined that “GST will prove a boon for our economy as well as for consumer also. Overall GST will be a great change”

Dr. Rashi Gupta (2017)⁸ in her study “Goods and Services Tax – A Positive Reform in Indian Taxation System” has remarked that “GST will provide relief to producers and consumers by providing wide and comprehensive coverage of input tax credit set-off, service tax set-off and subsuming the several taxes. GST will have a positive impact on various sectors and industry.”

OBJECTIVES

1. To find out the perception of retailers on Goods and Services Tax
2. To study the effect of Goods and Services Tax on retailers' business
3. To compare Goods and Services Tax with Value Added Tax as per the working experience of retailers

RESEARCH METHODOLOGY

The study was mainly based on primary data that has been collected through administering questionnaires. Personal interview with retailers has been adopted to obtain first-hand information. Various journals and websites were also used for reference. This study is both analytical and descriptive.

There are seven taluks in Thrissur District. These are Thrissur, Kodungaloor, Chavakad, Thalapilly, Mukundapuram, Kunnamkulam and Chalakudy. Among these, Kodungaloor taluk was selected using random sampling method. It is one of the probability sampling methods. From Kodungaloor taluk samples were selected using the convenience sampling method which is one of the non-probability sampling methods. The tools used for the study include percentage analysis, weighted average mean, Z-test and correlation.

LIMITATIONS OF STUDY

- Small scale retailers rely on tax consultants for taxation matters. So, they don't have clear knowledge regarding tax provisions.
- Comparison between different retailers is not possible.
- Some provisions of law still waiting for implementation.

DATA ANALYSIS AND INTERPRETATION

1. Difficulty in Understanding GST System

Table 1

Total	Difficulty in Understanding GST		Duration of Business
	No	Yes	
5	2	3	Less than 2 year
9	2	7	2 -5 year
12	5	7	5 – 10 year
24	9	15	More than 10 year
50	18	32	Total
100	36	64	Percentage

(Source: Primary data)

The above Table 1 shows that 64% have difficulty understanding the GST system. But 36% have no difficulty in understanding the GST system.

2. Source Depended for Understanding GST System

Table 2

Percentage	Number of Response	Source Depended
100.0	32	Tax consultant
12.5	4	Friends
3.13	1	Tax officials
3.13	1	Government publications
3.13	1	Books and journals
3.13	1	Seminars/workshops
3.13	1	Own employees
6.25	2	Others

(Source: Primary data)

It is clear from Table 2 that, among the multiple choices that were provided, all merchants having difficulty in understanding the GST system depend on tax consultants i.e., 100%. Apart from that 12.5 % depend on friends also.

3. Source Depended by Retailers for Filing Returns and Forms

Table 3

Percentage	Number of Response	Source Depended
100	50	Tax consultant/Chartered Accountant
0	0	Own employees
0	0	Tax officials
0	0	Friends
0	0	Others
100	50	Total

(Source: Primary data)

Table 3 shows that 100 % of the samples depend on tax consultants for filing returns and forms. So, tax consultants play an important role in the filing of GST returns and forms.

4. Transition to GST

Table 4

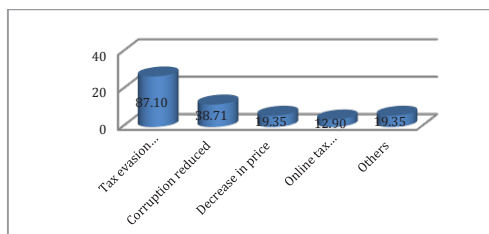
Total	Transition to GST		Duration of Business
	Difficult	Smooth	
5	2	3	Less than 2 year
9	3	6	2 – 5 year
12	7	5	5 – 10 year
24	16	8	More than 10 year
50	28	22	Total
100	56	44	Percentage

(Source: Primary data)

From the above Table 4, it is clear that 56 % of the samples found it difficult to move into the GST system. However, 44 % of the samples opined that moving into the GST system was smooth. More than half of the samples with business experience over 5 years found difficulty in moving to the new tax system.

5. Positives Found in GST System

Figure 1

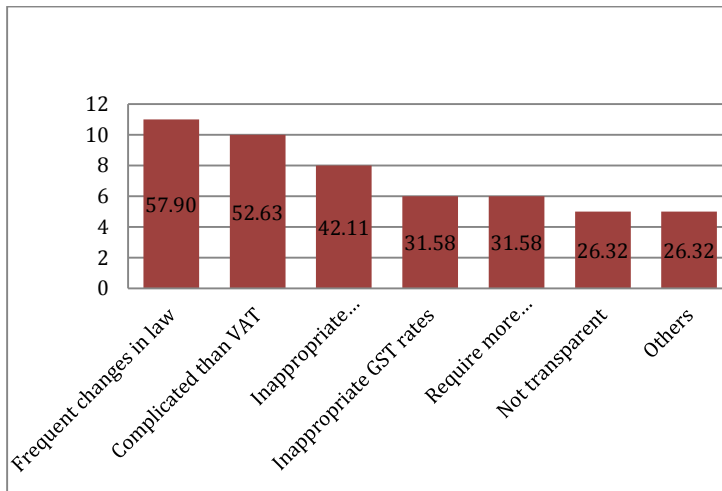


(Source: Primary data)

The above Figure1 shows that, among multiple choices given to retailers who found positives in GST, a majority, i.e., 87.10% opined that tax evasion got reduced due to the introduction of GST. 38.71 % found that corruption has been reduced as a result of GST.

6. Negatives in GST System

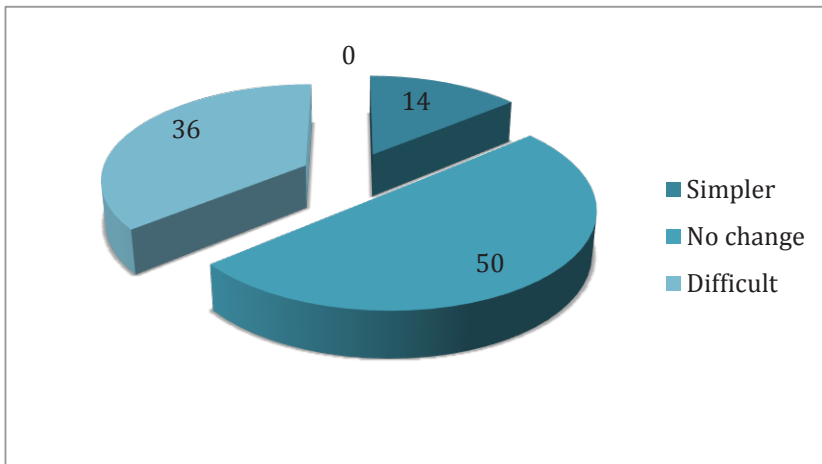
Figure 2



From Figure 2 it is clear that, among multiple choices given to the retailers who found negatives in GST, 57.90 % opined that one of the important negatives for GST is frequent changes in the law. 52.63% felt that it is complicated than VAT. And 42.11% stated that GST has inappropriate classification.

7. Comparison of Book Keeping Requirements in GST with that of VAT

Figure 3



As per Figure 3, 50% claimed that bookkeeping requirements are not affected by GST. But 36 % claimed that it is more difficult to meet bookkeeping requirements in GST. And 14 % opined that bookkeeping requirement in GST are simpler when compared to VAT.

8. Beneficiaries of GST System

Table 5

Rank	Mean Score	Total	1	2	3	4	5	Weight	Particulars	Sl. No.
II	3.42	48	5	10	5	16	12	F	Customers	1
		164	5	20	15	64	60	Fx		
III	2.63	48	9	11	18	9	1	F	Dealers	2
		126	9	22	54	36	5	Fx		
IV	2.52	48	9	16	14	7	2	F	Tax officials	3
		121	9	32	42	28	10	Fx		
I	4.04	48	1	16	7	4	28	F	Governments	4
		194	1	32	21	16	140	Fx		
V	2.40	48	24	3	4	12	5	F	Others	5
		115	24	6	12	48	25	Fx		

(Source: Primary data)

From Table 5 it is clear that, among the five benefactors of the GST system, it is most favourable to the government and secondly it is most favourable to customers. But it is least favourable to tax officials and others. So first run as the highest beneficiary of the GST system goes to the government as it has the highest mean score.

9. Effect of GST on Factors

Table 6

Effect of GST												Factors	
Total			Unfavourable			No change			Favourable				
S	%	R	S	%	R	S	%	R	S	%	R		
84	100	50	23	46	23	40	40	20	21	14	7	Price	1
63	100	50	38	76	38	22	22	11	3	2	1	Margin	2
66	100	50	37	74	37	20	20	10	9	6	3	Cost	3
73	100	50	30	60	30	34	34	17	9	6	3	Discount	4

(Source: Primary data)

R: Respondents, %: Percentage, S: Score

From Table 6 it is clear that 54 % of retailers claimed that GST does not result in a price increase. Margin, cost and discount have unfavorably changed as per 76%, 74 % and 60%.

Z Value of Various Factors:

Hypothesis for the test:

The impact of GST is equal on various factors

Sub – hypothesis:

1. There is no significant difference between the effect on price and the overall effect of GST.
2. There is no significant difference between the effect on margin and the overall effect of GST.
3. There is no significant difference between the effect on cost and the overall effect of GST.
4. There is no significant difference between the effect on discount and the overall effect of GST.

Z Value of Factors

Table 7

Z value	Standard Error	Standard Deviation	Mean	Factors	
2.507	0.0997	0.705	1.68	Price	1
2.494	0.0682	0.482	1.26	Margin	2
1.339	0.0821	0.581	1.32	Cost	3
0.349	0.0858	0.607	1.46	Discount	4
		0.621	1.43	Grand mean	5

The critical value of Z at 5 percentage level of significance is ± 1.96

Sub - hypothesis 1 and 2 is rejected. So there is a significant difference between the effect on price and margin and the overall effect of GST. And the main hypothesis is rejected since the impact of GST is not equal among various factors.

From Table 7 it can be concluded that the overall effect of GST is 1.43. This indicates that GST has unfavourably affected most of the factors. The effect on price (1.68) is considerably greater than this value. But the effect on margin (1.26) is considerably lower than this value.

From the Z – test it is clear that GST least affected the price and most affected the margin when compared to other factors. The effect of GST on cost and discount is almost equal to the overall effect of GST.

10. Correlation between Easiness of Return Filing Under VAT and GST

Table 8

Y ²	X ²	xy	GST (y)	VAT (x)
400	625	500	20	25
2304	15376	5952	48	124
1764	576	1008	42	24
1444	144	456	38	12
0	0	0	1	0
5913	16721	7916	149	185

$$\text{Correlation or "r"} = \frac{n\sum xy - (\sum x)(\sum y)}{(\sqrt{n\sum x^2 - (\sum x)^2})(\sqrt{n\sum y^2 - (\sum y)^2})}$$

$$= 0.63$$

Figure 4

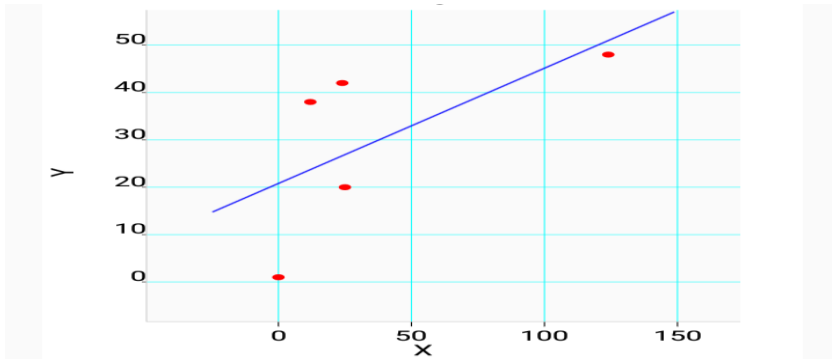


Table 8 shows that there is a moderate positive correlation between the easiness of return filing under VAT and GST. This means the retailers who found it easy to file a return under VAT also finds it easy to file a return under GST on a moderate proportion and vice versa. This mismatch is due to the lack of experience among retailers.

11. Correlation between Easiness of Understanding VAT and GST

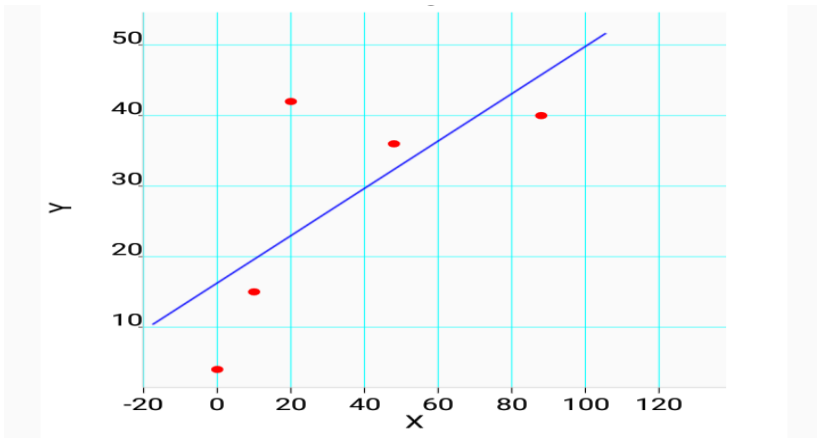
Table 9

Y ²	X ²	xy	GST (y)	VAT (x)
225	100	150	15	10
1600	7744	3520	40	88
1296	2304	1728	36	48
1764	400	840	42	20
16	0	0	4	0
4901	10548	6238	137	166

$$\text{Correlation or "r"} = \frac{n\sum xy - (\sum x)(\sum y)}{(\sqrt{n\sum x^2 - (\sum x)^2})(\sqrt{n\sum y^2 - (\sum y)^2})}$$

$$= 0.703$$

Figure 5



It is evident from Table 9 that there is a moderate/limited degree of positive correlation between the easiness of understanding VAT law and GST law. This means that the people who find it easy to understand provisions of VAT also finds it easy to understand provisions of GST on a moderate proportion and vice versa.

FINDINGS

- 1) More than half of retailers found it difficult to understand the GST system. So, GST is not easy to understand as per most of the respondents. Among the respondents who have

difficulty in understanding, the GST system approaches at least tax consultants for clearing their doubts.

- 2) All of the respondents don't file returns and other forms by themselves but with the help of tax consultants / Chartered Accountants.
- 3) Transition to GST was difficult according to more than half of retailers. All of the respondents appointed consultants to facilitate a transition to GST.
- 4) More than half found positives in GST. According to the respondents who found positives in GST, the most chosen positive is that it reduced tax evasion. Some found that corruption also reduced as a result of the introduction of GST.
- 5) Among retailers who found negatives in GST, frequent changes in the law are the negative characteristic chosen by most of them. Also half pointed that GST is complicated when compared to VAT.
- 6) Respondents felt that GST favours the Government most and secondly the customers. But GST is unfavourable to tax officials and others.
- 7) Every factor like price, margin, cost and discount was affected negatively by GST. And among the factors, price is the least affected factor. The most affected factor is the margin.
- 8) Half claimed that the bookkeeping requirement under GST has no change when compared to VAT.

- 9) The retailers who found it easy to file the return under VAT also finds it easy to file the return under GST on a moderate proportion and vice versa.
- 10) The retailers who found it easy to understand provisions of VAT also found it easy to understand provisions of GST on a moderate proportion and vice versa. This mismatch may be due to a lack of experience.

SUGGESTIONS

- 1) More awareness needs to be given to traders since they find it difficult to understand the GST system and they are not independent to file returns and forms on their own.
- 2) Most chosen negative of GST is frequent changes in law and therefore it has to be avoided as it is difficult for the retailers to follow.
- 3) The working of tax consultants needs to be monitored as they have a major role in indirect tax mechanisms especially in the case of retailers.
- 4) Retailers should be optimistic and should hope that the GST will help them in the long run.

CONCLUSION

The study entitled **“Perception of Retailers on Goods and Services Tax with Special Reference to Thrissur District”** focuses on studying the overall perception of retailers on GST. The study also aimed at examining the effect of GST on retailers’ business, compare the experience of retailers under the present tax system and previous tax system and assess the difficulties in the current tax system.

The study reveals that respondents do not file returns and other forms on their own. Tax consultants play a crucial role in the filing of returns, clearing the doubts of retailers and the transition of retailers from VAT to GST. The margin of retailers is negatively affected due to GST. While comparing the experience of retailers during GST with that of VAT those who found it easy to deal with the previous system also finds it easy to deal with the current tax system on a moderate proportion.

It can be concluded that small retailers find it difficult to understand the GST system. And the impact of GST on various factors is not uniform. But we can hope that the present difficulties can be solved by the new provisions still to be implemented and by the experience factor of retailers.

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QUESTIONNAIRE TO MEASURE THE PERCEPTION OF RETAILERS ON GOODS AND SERVICES TAX

- A. Name of the shop
- B. Name of the respondent
- C. Type of business
(Sole trader/ Partnership /Private Company)
- D. If yes, how many?
- E. What type of product is dealt in this shop?
(Stationery / Jewellery / Paints / Medicals / Electronic gadgets /Textiles/ Bakery / Others (specify))
- F. How old this shop is?
(Less than 2 years/ 2-5 years/ 5-10 years/ More than 10 years)

G. Approximate annual turnover of shop

(Less than 20 lakh/ 20-50 lakh/ More than 50 lakh)

1. Do you find difficulty in understanding GST system? :

YES/ NO

(If yes) how could you learn?

Government publication/Books and journals

Seminar/ Workshops

Tax officials

Tax consultant

Own employees

Friends

Others

2. Are you able to file the returns and other forms by yourself? :

YES/NO

(If no) how do you file the returns and other forms?

Tax consultant/ Chartered accountant

Own employees

Tax officials Friends

Others

3. How do you feel the transition to GST?

Smooth / Difficult

4. How the transition was facilitated?

Completely outsourced / Appointed consultants /

Dedicated team / Others

5. Do you think that the GST system introduced after demonetization has further decreased the economic activity of your circle?: YES / NO

6. Do you find any positives in GST system? : YES/ NO

(If yes) please state the positives (You can choose more than one option)

Tax evasion came down

Product price decreased due to low GST rate

Present system of online filing made tax administration simple

Corruption has come down Others

(If no) please state the shortcomings (You can choose more than one option)

Lack of transparency

More complicated than the earlier VAT

Disparity in GST rate is not appropriate

Classification of goods under GST is not appropriate

More amount of information is required to comply with GST

Frequent changes in law Others

7. According to you, whom does the GST system favor? (Rank 1, 2, 3..... in order of relative importance)

Customers

Dealers

Tax officials

Governments

Others

8. Do you want the government to go back to VAT? : YES / NO
9. Rating of GST regime on a scale of 1 to 10 (1 being poor and 10 being excellent)
- 1 2 3 4 5 6 7 8 9 10
-
10. State the effect of GST on price
- No change / Decrease in price / Increase in price
11. State the effect of GST on margins
- No change / Positive / Negative
12. State the effect of GST on cost
- No change / Decrease in cost / Increase in cost
13. State the effect of GST on discount got from suppliers
- No change / Increase in discount / Decrease in discount
14. Accounting and book keeping requirements in GST as compared to VAT
- Simpler / Same as before / More difficult

**RECLAMATION OF THE EXPLOITED SELF: A
POSTCOLONIAL BLACK WOMANIST
READING OF TONI MORRISON'S *BELOVED***

Meera Kesavan

Department of English

ABSTRACT

The African American literature is literature about a movement, not only geographical, historical and political, but also psychological and emotional. Toni Morrison, the winner of the Nobel Prize for literature, is a towering figure in the contemporary American and African-American letters and has drawn a lot of attention from mainstream critics at home and abroad. Morrison's novels, *The Bluest Eye*, *Sula*, *Song of Solomon*, *Tar Baby* and *Beloved*, assume boundaries that encompass objectification of women. Understood from the perspective of a black woman, the dominant society's gaze, construed as white and male, is driven by a layering of motivations that express not only sexual objectification but also racism and classism in its operations

INTRODUCTION:

The history of slavery occupies the central position in Black American literature. The history of Black American

literature, which began with the slave narratives, analyzed the problem of racial discrimination in its philosophical, existential, epistemological and emotional aspects. Among the many prominent faces in Black American literature, Toni Morrison, as a writer, stands out principally owing to the compelling narratives she had penned. Her fifth novel, *Beloved*, which won her the Pulitzer Prize in 1988, is considered by many to be her best work.

Beloved: Tale of Three Generation of Women

Usually classified as a neo-slave narrative, it deals with slavery and the myriads of traumas inflicted by such a horrifying institution on the survivors. The novel is set in the free state of Ohio and the slave state of Kentucky. The story on which the novel is based is an 1856 newspaper report of a runaway slave from Kentucky named Margaret Garner by P. S. Bassett, “A Visit to the Slave Mother Who Killed Her Child” in *American Baptist*. When Margaret Garner realizes that she is about to be recaptured under the Fugitive Slave Law, she kills her child rather than allow it to return to a future of slavery. Sethe is the fictional representation of Margaret Garner, a slave who has killed her two-year-old daughter due to the fear of going back to slavery.

Toni Morrison is regarded as the initiator of the crucial interface between postcolonialism and slavery, a relationship that has not been addressed with similar intensity. *Beloved* is the finest

example of this powerful literary relationship. Set in the final years of American slavery and its immediate aftermath, *Beloved* is an insight into the fragmentation of a black family in a post-colonial context. In *Beloved*, in addition to foregrounding race and racism, she emphasizes the construction of identity and how identity is not only radicalized but gendered as well. *Beloved* presents the speech of a resurrected female slave Sethe and shows how motherhood gets imprisoned in the curse of slavery.

Though the importance is given to the central character Sethe, the mental tortures that different characters undergo in the novel creates a larger dimension to slavery. The dehumanizing experiences in ‘Sweet Home’ are presented in the novel in a non-chronological order through the memories of different characters like Sethe, Paul D, Baby Suggs etc. The concept of the ‘Other’ brought by the colonizers gave the blacks a torturing time to follow in their lives. None of them was expected to ask for their rights and freedom and was even deprived of humanity in the plantation of ‘Sweet Home’. *Beloved* circles around all these complexities and hints at the different fates of a group of slaves who once lived in this plantation in Kentucky named ‘Sweet Home’ – of course neither ‘sweet’ nor ‘home’. The major characters include an old woman called Baby Suggs, her son Halle, Paul A, Paul D, Paul F, Sixo and the one young woman, Sethe, the latter having realized that ‘Sweet Home’ is “a wonderful lie”. (Morrison 221)

The violence experienced by the slaves at ‘Sweet Home’ comes from the figure of the school teacher, presented as an incarnation of the brutality and domination. He views slaves as commodities and animals. He wants to use the slaves more profitably, which is the idea behind every painful treatment undergone by the slaves in ‘Sweet Home’. As a result of the brutal treatment of their master, the ‘Sweet Home’ slaves plan to run. During the escape, Paul A gets caught and is hanged. Sixo gets caught and is burnt alive. Paul F is long gone and sold. Paul D gets caught and is sold in chains. Halle is captured and driven to madness by physical and mental torture. Sethe bitterly remembers her situation after being brought back to ‘Sweet Home’ where she is whipped so brutally by the nephews of a school teacher. And she also remembers, “those boys came in there and took my milk. ... Held me down and took it” and they handled me like I was the cow, no, the goat, back behind the stable because it was too nasty to stay in with the horses” (200). Morrison raises the question of authority over one’s own body in this incident. The image of a tree on the back of Sethe and other slaves represents the painful whipping they received on the work fields. This tree image keeps alive the sufferings of the Afro-American people. This same pain made Sethe commit infanticide.

The novel *Beloved* is a search for the identity of the black woman that was repressed by the white imagination. In the novel,

this identity is concerned mainly with the question of motherhood. At the beginning of the novel, the central character Sethe is living in Cincinnati with the memories of her past life, being a slave, wife and mother. The roles normally assigned to the females in the society were denied to the slaves in the 'Sweet Home' plantation. The influence of white supremacist ideology and its dazzling effect on the black community is best portrayed through the character of Sethe. Whenever the school teacher appears, stereotypical representations of a black woman rise to the surface like an oil spill and allow Morrison to reshape its outlines by her tool of language.

Black feminist writers criticized the misconception of a black woman that they are sexually loose and available. This misconception has its deep roots in the Western ideas of the African woman. This stereotypical attitude was reinforced on the plantations, where black women were exploited and abused. 'Sweet home' and its owner, the Schoolmaster and his nephews stand for the white patriarchal ideology. The school teacher practiced his authority as the definer. He and his nephews represent the white patriarchy. The memory of Sethe's stolen milk shows the picture of her helplessness and her humiliation being a woman and a black slave. However, Sethe did not accept the cruelty imposed on her.

Morrison's Sethe is one of the complex black female characters ever written compared to those in her other works from a black feminist perspective. Morrison places her central character amid pain, suffering, and shackles of racism and sexism and tries to bring her freed self, enough to make a strong voice against the dominant strategies of that time. At the beginning of the novel, Sethe is described as a weak nurturer lacking sovereignty. However, her character changes due to traumatic experiences gained as a slave and a fugitive slave, making her stronger. She escapes from the plantation and amid her escape, Sethe gives birth to Denver in the forest. In the novel, no man rushes to rescue Sethe. Sethe's attempt to escape and act of infanticide can be determined as a retaliation against the white supremacist ideologies that made a mother powerless by every means. Her escape to freedom temporarily inscribes masculine characteristics to her figure. As a result, she enjoys twenty-eight days of freedom in Ohio with Baby Suggs.

For a short period, she becomes a 'masculine mother' who has power over her life and the lives of her children. The 'old Sethe' would not be capable of murder, but a masculine mother does not feel constrained and reaches for a handsaw. She chooses whether her child should rather die than live as a slave. Morrison depicts the bravery and courage in Sethe which raise powerful questions regarding black women's self-identity, self-concept and

struggles to achieve freedom as a living being if not a human being: a path which will deepen our understanding of women issues in general. Sethe is excluded from her community because her self-sufficiency and independence are seen as something unnatural and threatening and is not perceived as “normal” behaviour in the eyes of the white society. But Sethe learns how to accomplish her individuality despite the constant opposition of men, but also of the other women of the black community at the end of the novel. Though Beloved comes to make Sethe pay for what she did, as a mother she starts loving her and enjoys her company. Beloved’s unending questions bring the dirty memories into the mind of Sethe and force her to analyze them all. When she slowly starts collapsing out of her mental and physical strength, Denver seeks the help of the community to exorcise Beloved. Sethe’s isolation among the four walls of 124 Bluestone Road can be understood as a place of redemption where Sethe can define her identity to some extent. She also limits her life to the premises of the house and at this point, she is able to see a way to search for her true identity.

Morrison represents the rebirth of black identity among downtrodden people through the female characters of *Beloved* by combining the history of slavery with the supernatural elements. Sethe’s quest for identity is a direct result of enslavement as every slave created his/her identity based on the definition provided by

white people. Sethe has a deep longing for an explanation of the past action, and for forgiveness, wake into being the ghost of her murdered daughter Beloved. Morrison employs a supernatural element in the central position which plays a crucial role in the formation of Sethe's self. It is none other than the ghost Beloved. Beloved is not only the ghost of Sethe's murdered daughter but also a powerful symbol of the link between the present and the past. Sethe's identity is formulated with the connection to her past which she obtains through the ghost of Beloved.

Baby Suggs, another epitome of womanist courage, is compelled to learn to master her maternal feelings on the plantation. Baby Suggs represents a past generation of slavery and its impact on blacks. Like Sethe, Baby Suggs also has an unforgettable slave past on the 'Sweet Home' plantation. Baby Suggs life encounters many losses until she gets freedom through his son Halle. She lost all of her children, besides Halle. Her womanist consciousness takes birth after she gains freedom which can be read as a result of the inhuman experiences she had undergone in the 'Sweet Home' plantation. Despite this tragic existence, Baby Suggs emerges for a time as the model of resistance and spiritual leadership for her community.

She is a woman who keeps intact her self-respect which can be analyzed as an important feature of a womanist. Baby Suggs encourages the people to self-love and self-affirmation,

even though the dominant culture encourages them towards self-hatred and self-negation. Thus, she holds the basic womanist dictum of loving the self and also loving the other black women of her community. Baby Suggs exercises her priestly function in her new role as an unchurched preacher by taking care of their physical hunger and spiritual needs. In *Beloved*, the spiritual presence of Baby Suggs imparts a healing touch to the bruised lives of the blacks. It is she who calls them for the "woodland service" - men, women and children alike. This all-inclusive feature is at the heart of womanism. Baby Suggs' unchurched preaching role in *Beloved* marks the beginning of the contemporary womanist sermon. Baby Suggs' character is a strong example of how spirituality becomes a local practice to combat daily struggles and ensures a sense of survival for enslaved and freedwomen.

The basic womanist dictum is that women must build up a culture of freedom, even though the price may be quite exacting. Baby Suggs, possesses the spiritual gift of empowering others in great measure. She energizes those who come into her ambience. Thus, Baby Suggs' big heart initiates a new culture of freedom in the black community. Baby Suggs is the type of person who brings hope in a hopeless situation. However, the non-committal attitude towards her daughter in law's shocking infanticide alienates her from the community. In reality, the coming of the white man in

her yard and Sethe's infanticide shocked her, but as a mother, she understands the pain and reason that lead to the brutal infanticide.

Baby Suggs ends her life as a failed fighter in *Beloved* but Denver transforms from a childish and selfish girl to a mature and responsible one. In the case of Denver, her life is quite different from her mother Sethe and her grandmother Baby Suggs. Denver has never experienced the rigours of slavery, yet it makes a profound emotional and psychic impact on her and her relationships with others. She is discernibly dependent for her identity first on Sethe, then on Beloved. Nothing in Denver's life suggests a typical childhood life. She has never seen her long-absent father. The community ostracizes her mother. Her grandmother is long dead. She is starved of even Sibling Company. Denver is searching for a sense of clarity, but, most importantly, she is searching for her connection to this tumultuous past. Before Beloved knocks on the door to 124, Denver lives an empty life. Denver assumes the role of Beloved's protector. Her expectations come true and she can have Beloved to herself at least for a little while. By having Beloved to herself, Denver moves to another stage in her development. But it is Denver who realizes the real intention of Beloved, which is to punish their mother Sethe for the infanticide she committed. Nevertheless, Denver's dependence on Beloved ends when she finds herself excluded from Sethe's and Beloved's game. She sees how Sethe is starving

so Beloved can eat, “spit up something she had not eaten” (243), a perception that “rocked Denver like a gunshot” (243).

What makes Denver unique is first her ability to see and feel this destruction. She recognizes hers and her mother's destruction and it is this recognition that saves her from completely losing herself. Thus, Denver reopens her journey towards empowerment and self-actualization. Finally, Denver moves to another stage of self-affirmation when she refuses to be passive since living in the past is no longer an option for her. Rather, ultimately, as the relationship between Sethe and Beloved becomes increasingly absurd in the closed world of 124, Denver slowly understands that she must "leave the two behind and go ask somebody for help" (243). She slowly grows as a character, giving herself the advantage of being courageous. Denver understands that one of the most important tools for survival is community. She breaks down the wall of silence that has surrounded 124 Bluestone Road and the community and asks the community's help. The community accepts Denver as they did not accept Sethe because Denver, unlike her mother or Beloved, does not try to "do it all alone" (254) at least she "had stepped out of the door, asked for the help she needed" (256). As Denver reminds the women of her mother's deed eighteen years before, she also reminds them of their responsibility for that deed. In doing so, she is giving the people who have shunned them for eighteen years the opportunity

to mend the gap between past and present at the same time healing themselves as a community of survivors. Thus, she is once more the survivor of her mother from a complete disaster. In doing so, Denver corrects Baby Suggs passivity, for she could not or would not do anything to stop Sethe, as she now disarms her mother before she kills Mr. Bodwin. When she meets Nelson Lord for the first time, he had asked her the question that had defeated her. Now he calls her "Miss Denver" (267). Denver is the most dynamic character in the novel; she experiences the most positive personal growth in *Beloved* and represents the African American hope for the future.

Beloved depicts the three generations of black slave women through Baby Suggs, Sethe, and Denver. *Beloved* gives voice to the unspeakable pain of many slave women by bringing to the surface their unseen and unrevealed sorrow as mothers and black females. But each has her ways to respond or articulate the experiences of slavery. By depicting three generations of black life through Baby Suggs, Sethe and Denver, Morrison probes into the deeper levels of black female life in social reality and provides a strong voice against the existing black female stereotypes.

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MASS MULTIPLICATION OF *MORINDACITRIFOLIA* (NONI): A HIGHLY POTENTIAL MEDICINAL PLANT

Raydhabeegum P. M

Department of Botany

ABSTRACT

Noni, *Morindacitrifolia*L. (Rubiaceae), is a small, fruit-bearing, evergreen shrub or tree that now grows throughout the tropics. It is a traditional source of medicine, dye, and food for indigenous peoples, and it recently has been marketed internationally as a dietary supplement. Seed propagation takes more time for germination and also variation in fruits, whereas, stem cuttings can be rooted early and with no variations in fruits. To overcome the problem with seeds, vegetative propagation could be tried as potential means of propagation of quality planting stock. Cutting is a method to propagate Noni by the use of detached plant parts which when placed under favourable conditions develop into a complete plant resembling in all characteristics to the parent from which it was taken. A study was conducted at Carmel College Botanical Garden to develop a standard vegetative propagation technique through cuttings. Among the different types (Tip, Semi-

hardwood and Hard woodcutting) with a different number of nodes (2, 3 and 4), Hardwood cuttings with 4 nodes perform better and give more success percentage and healthy planting material.

Keywords: *Morindacitrifolia*, tip cutting, semi-hardwood, hardwood, propagation.

INTRODUCTION

Noni is a wonder crop expecting our respect to become a commercial orchard crop under cultivation. Noni, commonly – Indian Mulberry and scientifically *Morindacitrifolia*L. belongs to the coffee family Rubiaceae. Plants naturalized to the tropics, subtropics, especially under evergreen (rain) forest climate. Different genotypes (Species and Botanical varieties) and ecotypes varying in yield and quality parameters are there all over the world. To convert this wild crop into a domestic crop we have to find an elite plant and it should be multiplied vegetatively to maintain its parent's nature.

The production of a large number of saplings from the limited elite pedigree tree could be possible within a short period and could meet the growing demand by the farmers. The true pedigree plants thus produced in the country can enhance the foreign exchange earning capacity. Though it has greater demand hitherto, no efforts on its propagation have been made owing to its hollow nature of stem. Its domestication is possible only by

standardizing the propagation techniques. The Noni seeds have a problem of seed dormancy/hard seed coat (water repellent) thus limiting its commercial cultivation. The primary disadvantage of seed propagation is that it takes more time for germination and also variation in fruits, whereas, stem cuttings can be rooted early and with no variations in fruits. To overcome the problem with seeds, vegetative propagation could be tried as potential means of propagation of quality planting stock. The goal of vegetative propagation is to get the best planting stock with the highest genetic quality material (Wright, 1975). For making plants through cuttings, it is essential to know the proper techniques for the vegetative propagation of this crop.

Cuttings are the very common, easy and cheapest method of vegetative propagation. Healthy parent plant, part of the stem, size of the stem, length of cuttings, number of nodes, rooting media, growing structure are considered to influence success percentage and production of healthy plantlets. In this experiment, we mainly considered types of cuttings and the number of nodes.

General Description -*Morindacitrifolia* L.

Plant: Woody vines, lianas, shrubs, medium-sized trees or tall canopy trees; rap hides present; auxiliary thorns absent.

Stipules: Interpetiolar, free at the base or interpetiolar, connate at base or sheathing (not splitting on one side), oblong or ligulate,

spatulate or bifid, sheathing at base, with two small (non-foliose) lobes each side, persistent. **Leaves:** Opposite or whorled, rarely ternate, 3 per node, long or shortly petiolate; blades ovate, broadly elliptic, oblong or oblanceolate, chartaceous or stiffly chartaceous; *foliar pellucid glands* absent; *domatia* sparse or dense tufts of hairs or absent. **Inflorescence:** Axillary or terminal, simple panicle or umbellate heads, not frondose, globose, not subtended by bracts. **Flowers:** Bisexual, protandrous. **Calyx:** Tubular, urceolate or hemispheric, extremely reduced, with small lobes or short tubular, caducous; lobes absent (calyx truncate or undulate) or 4 to 7, broadly triangular, minute. *Calycophylls* absent. **Corolla:** Tube, more or less funnel-shaped, hypocrateriform or narrowly infundibuliform, actinomorphic, white to cream-white; tube externally glabrous, internally glabrous or pubescent; without a pubescent ring inside; orifice annular thickening absent; lobes 4 to 7, valvate in bud, lanceolate or oblong, margin entire, obtuse or acute at apex. **Stamens:** Alternate to the corolla lobes, included, partially exerted (only tips exerted) or exerted just beyond the corolla; anthers narrowly oblong or elongate, round at the base, with acuminate extensions at apex, dehiscent by longitudinal slits, dorsifixed near the middle; filaments attached at the middle of the corolla tube, free at the base, slender, long, shorter than corolla tube, equal, glabrous. **Style:** Exerted just beyond the corolla, terete throughout, not fleshy or terete, not fleshy, capitate, glabrous; lobes absent or 2, ovate, oblong or linear, stigmatic surface located

at style apex. Exert. **Ovary:** Inferior, 2- or 4- locular, narrowly obovoid; placenta reduced, ovules basally inserted, 1 per locule. **Fruit:** Densely clustered globose syncarp, fleshy. **Seeds:** Vertical, medium-sized, ovoid to obovoid or reniform; wings absent.

MEDICINAL USES

The fruit of this plant has been used as food, drink, medicine, colourful dye, cosmetics purpose and has a high demand for medicines for different kinds of illnesses like diabetes, high blood pressure, AIDS, arthritis, cancer, gastric ulcer, sprains, mental depression, senility, poor digestion, atherosclerosis, blood vessel problem etc., Its root, leaves, stem, bark, flowers and fruits are recorded as herbal remedies for different diseases (Wanget al.,2012).

Morinda citrifolia is reputed to have antibacterial, antiviral, antifungal, antitumor, anti-tubercular effect. Due to its beneficial effects, the fruit juice of *M. citrifolia* is widely distributed throughout the world as a nutraceutical dietary supplement. The leaf of this plant is directly used on the skin for ulcerations and minor infections (Duke et al., 2002). Morinda has been heavily promoted for a wide range of uses; including arthritis, atherosclerosis, bladder infections, boils, burns, cancer, chronic fatigue syndrome, circulatory weakness, colds, cold sores, congestion, constipation, diabetes, drug addiction, eye

inflammations, fever, fractures, gastric ulcers, gingivitis, headaches, heart disease, hypertension, immune weakness, indigestion, intestinal parasites, kidney disease, malaria, menstrual cramps and irregularities, mouth sores, respiratory disorders, ringworm, sinusitis, sprains, stroke, skin inflammation and wounds (Elkins 1997). The primary indigenous use of this plant is leaves as a topical treatment for wound healing. Several animal studies suggest Noni may have anti-cancer (McClatchey 2002), immune-enhancing and pain-relieving properties (Hiramatsu T 1993). Most recently Takashima et al. 2007 demonstrated the medicinal uses of new constituents isolated from Noni leaves and used traditionally to promote wound healing.

Objective

To find out the specific type of stem cutting and the number of nodes per cutting required for mass multiplication of *Morindacitrifolia*(Noni).

Fig.1 *Morindacitrifolia* –Habit



Morindacitrifolia flowers and fruits



MATERIALS AND METHODS

To find the specific type of stem cutting and the number of nodes per cutting required, a field experiment was conducted at Carmel College, Mala.

Preparation of cuttings:

Cuttings of 15-20 cm length with uniform pencil thickness were selected and prepared from an ideal mother plant from Thiruthipuram. Selected cuttings were carefully prepared by giving a slanting cut (45°) at the bottom to expose more cambial area to absorb more moisture and form roots. Bottom cuts were given just immediate to the nodes and planted in a slanting position.

Rooting media and growing condition:

Using a mixture of sand and vermicompost (1:1) raised beds were prepared under 50% shade net with polytunnels.

Planting of cuttings:

Prepared cuttings were planted at 10-15 cm apart with half portion of cutting inside the soil and take care that the flower buds were not damaged. The soil was thoroughly pressed around the cuttings and watered regularly to keep it moist.

Experimental design:

Experimental design followed was a Completely Randomized Block Design (CRBD). There were nine treatments with three replications. Each treatment was with 30 numbers of cuttings.

Treatment details:

Three different types of cuttings with 3 different node numbers were used. The treatment details are presented in Table 1.

Table 1: Details of treatment

Number of nodes	Type of cutting	Treatments
2	Tip cutting	T1
3	Tip cutting	T2
4	Tip cutting	T3
2	Semi hard wood	T4
3	Semi hard wood	T5
4	Semi hard wood	T6
2	Hard wood	T7
3	Hard wood	T8
4	Hard wood	T9

RESULTS AND DISCUSSION

The results on success percentage in relation to the type of cuttings and number of nodes revealed significant differences among treatments (Table 1). It was observed that the success percentage was maximum (83%) in T 9 (Hardwood cuttings with 4 nodes) and the minimum (2%) in T 1 (Tip cuttings with 2 nodes). Type of cuttings influenced more effectively than the the number of nodes.

Table 2: Percentage of success in different treatments

Transplanted successfully to polybags (%)	Days after planting					Treatments
	45	40	30	20	10	
	2	2	7	10	15	T1
	3	5	9	13	14	T2
	4	7	11	13	15	T3
33	10	12	14	14	20	T4
53	16	17	18	20	23	T5
56	17	17	17	18	20	T6
66	20	20	20	21	23	T7
76	23	23	23	24	25	T8
83	25	25	25	26	28	T9

Types of cuttings are influenced by the factors like nutritional status of stem, age of the plant, etc. Hardwood stems with a high amount of carbohydrates and less nitrogen lead to better success. According to Kumar (2000) factors influencing shoot and root growth in cuttings are food supply (ratio of carbohydrate to nitrogen in the stems), age of the plant, type of cuttings and environmental conditions (water, temperature, relative humidity, light and rooting media). Noni is the perennial plant, in which stored energy is more in hardwood stem than in other parts. This is the plant with a typical hollow stem, which is weaker and with less cambial tissue wherever the stem is not well matured. Cambium is the primary tissue for the development of vascular tissue and the root system. So, the hardwood stem is less hollow and with more cambial tissue when compared to softwood and tip cuttings. Stored energy is more in hardwood cuttings to enhance shoot sprout and root initiation.

Gill *et al.* (1998) reported that a very common type of cutting propagation in the perennial plant is hardwood cutting. Hardwood cuttings are prepared from the trees when tissues are fully mature. The shoots of about one year old or more can easily be used for preparing hard wood cuttings. It is now recognized that the nutrition–status of stock plants exerts a strong influence on the development of roots and shoots from the cutting. Cuttings from plants with a high C/N ratio produce more roots but feeble shoots

as against those containing ample carbohydrate and higher nitrogen that produce fewer roots but stronger shoots. Cuttings from succulent stems with very low carbohydrate and high nitrogen do not succeed (Singh, 2000). The type of stem cutting is arbitrary, but 20 to 40 cm cuttings are manageable and effective in Noni (Nelson, 2003). The results of the above study revealed that the hardwood cuttings with four nodes are the best method to propagate Noni through cuttings. This can be applied at the field level for mass multiplication of ideal true to type plants through stem cuttings.

Fig 2 Mass multiplication of *Morindacitrifolia*





SUMMARY AND CONCLUSION

The fruit juice of *M. citrifolia*L. is in high demand in alternative medicine for various illnesses, such as arthritis, diabetes, high blood pressure, muscle aches and pains, menstrual difficulties, headaches, heart disease, Acquired Immune Deficiency Syndrome (AIDS), cancer, gastric ulcers, sprains, mental depression, senility, poor digestion, atherosclerosis, blood vessel problems and drug addiction.

The Noni seeds have a problem of seed dormancy/hard seed coat (water repellent) thus limiting its commercial cultivation. Seed propagation takes more time for germination and also variation in fruits. The results of the above study revealed that the hardwood cuttings with four nodes are the best method to propagate Noni through cuttings. Hardwood stems with a high amount of carbohydrates and less Nitrogen led to better success. Noni is a perennial plant, in which stored energy is more in hardwood stem than in other parts. Cambium is the primary tissue

for the development of vascular tissue and the root system. So, the hardwood stem is less hollow and with more cambial tissue when compared to softwood and tip cuttings. Stored energy is more in hardwood cuttings to enhance shoot sprout and root initiation. Hardwood cuttings can be applied at field level for mass multiplication of ideal true to type plants through stem cuttings.

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**GENDERING THE HOLY DISCOURSE: A
QUEER AND INTERTEXTUAL READING OF
WINTERSON'S *ORANGES ARE NOT THE ONLY
FRUIT***

Sangeetha K Sajeev

Department of English

ABSTRACT

LGBT people who are marginalized because of their sexuality have always had to seek mainstream acceptance to get the rights and freedom they deserve for a dignified life. It is often a grim struggle, marked by small victories and big setbacks. Sexual minorities often have to come to terms with their feelings first—they have to gain the self-confidence that they deserve respect, however “different” they might be from most other people. For those living in very orthodox settings, where all manner of societal pressures and facades are constantly operating on them, this is a particularly complex process. Jeanette Winterson’s semi-autobiographical debut *Oranges Are Not the Only Fruit* fits within the genre of lesbian bildungsroman and manipulates several of the monologic narratives on which mainstream culture rests.

INTRODUCTION:

People changed a lot of other personal things all the time. They dyed their hair and dieted themselves to near death. They took steroids to build muscles and got breast implants and nose jobs so they'd resemble their favourite movie stars. They changed names and majors and jobs and husbands and wives. They changed religions and political parties. They moved across the country or the world – even changed nationalities. Why was gender the one sacred thing we weren't supposed to change? Who made the rule?

(Ellen Wittlinger Parrotfish)

Oranges Are Not the Only Fruit tells the story of Jeanette's quest for subjectivity and homosexuality but rejects the traditional appropriation of the theory of the subject by the masculine and emphasizes instead the mother-daughter bonding as a counter-narrative of conventional masculine bondage that highlights female specificity and gender difference.

Jeanette Winterson was born in Manchester, England in 1959. She was adopted and brought up in Accrington, Lancashire, in the north of England. Her strict Pentecostal Evangelist upbringing provides the background to her acclaimed first novel, *Oranges Are Not the Only Fruit*, published in 1985. *Oranges* tell the story of Jeanette, a girl who is born and raised in a religious

family under the influence of her pious mother and the local community. Jeanette is homeschooled before her mother receives a letter to force Jeanette to be sent to school. In school, Jeanette becomes an outsider for her faith in God, and later in life, she is an outsider for her sexuality. She knows she is different, but her difference is not truly revealed until she meets a girl called Melanie. They quickly fall in love. As soon as the scandalous affair is discovered by Jeanette's mother, she asks the church to exorcise the demon in her daughter. Jeanette and Melanie are forced to break up. At the young age of sixteen, Jeanette leaves the church and her family. At the end of the book, she goes back home for Christmas, and sees her mother, not steadily holding on to the issue of Jeanette's sexuality anymore, have embarked on a new but still religious life.

Oranges Are Not the Only Fruit: A Queer and Intertextuality Reading:

Throughout the novel, there are changes in the narrative perspective used to tell the story. As she is recounting her own life, the narrator speaks in the first person. When telling mythic stories and fables, a third person is narrating them and when the reader on occasion is directly addressed, the second person point of view is employed. Many different themes are presented in this complex, thought-provoking novel. Comprised of eight chapters, each bearing the title of one of the eight books of the *Old Testament*,

the novel articulates archetypal themes related to family, religion, love, the construction of identity and the conflicts between the individual and the community. In terms of structure, the novel follows the postmodern tradition of experimentation, constantly interweaving stories like fables and dream sequences in the linear and chronological narrative of Jeanette. Thus, the novel may be considered as met fiction, which is a fictional novel that aims to question the nature of fiction and truth as opposed to the expressly fictional linear plot associated with realistic fiction. Winter son's placement of these stories in her novel has most likely the intention to make the reader question the nature of storytelling and fiction as well as objective reality. Even the gender of her narrators is sometimes unspecified. For Winterson gender was only a 'costume'. She had a great belief in the healing power of art. She never wrote to please the readers rather she wrote to bring about a change in consciousness.

Traditionally, *Oranges Are Not the Only Fruit* has mainly been viewed as a work primarily dealing with a young woman coming out as a lesbian in a truly binary and strict religious community and has been described by Susan Onega in her work *Contemporary British Novelists*, as "a realistic and heavily autobiographical comedy of 'coming out'" (18). This novel is keen, however, to question and scrutinize distinctions between fact and fiction. As Winterson comments in the preface of the novel: "Is *Oranges* an autobiographical novel? No not at all and yes of

course” (1). Nevertheless, the focal point among some critics and in several previous research papers has been the autobiographical nature of the novel. *Oranges* became troublesome already at its release on account of some coincidences found between Winterson’s personal life and her fictional alter ego, including the protagonist’s name, growing up with adoptive parents, being a lesbian and the experience of a strict, religious upbringing. It not only presents a version of Winterson’s documented life but also reflects Winterson’s view on her life and living in general. Winterson, however, rejects applying the tag of ‘autobiography’ to her novel *Oranges* since ‘autobiography’ has traditionally been associated with men and in general with the patriarchal system. She comes to question and subtly subvert this aspect through *Oranges* in an attempt to reassert herself as a woman and a lesbian.

The novel abounds with intertextual references. Intertextuality can be defined, according to Bazerman, for instance, as “the relation each text has to the texts surrounding it” (84). The analysis of intertextuality unavoidably leads us to the examination of other texts that somehow relate to the one we are analyzing. According to Bazerman, “we create our texts out of the sea of former texts that surround us, the sea of language we live in” (83). Winterson was brought up in the strict evangelical background in acquaintance with various intertexts such as The Holy Bible and *Jane Eyre*, and her thorough knowledge of the bible, especially the *Old Testament*, is reflected in her works.

Generally speaking, the intertextual relationship between the Bible and *Oranges* is demonstrated, on the one hand, through Winterson's appropriation of biblical narrative structure, and on the other hand, through the Bible's immediate influence on Jeanette's personal life.

Interestingly enough, the names of the chapters of *Oranges* are the names of the first eight books of the *Old Testament*. This appropriation of the Bible to some extent relates to the life story of Jeanette. Just as the first five books of the *Old Testament* are about the law of the world, the first five chapters of *Oranges* are also about the law of the world in which Jeanette lives. It's a world of cruelty and obedience. In this world, a father figure like God is absent; instead, the law is represented by a feminine figure, Jeanette's mother. The last three chapters tell the dramatic changes in Jeanette's life after her affair with Melanie is let out of the bag, just as the next three books of Joshua, Judges and Ruth narrate the history of Israel. Employing intertextuality, Winterson exposes linguistic and narrative conventions and provides alternative versions of history that focus on groups of people who have been marginalized by official history.

Conversely, *Oranges* affects the Bible as a critical commentary on its teachings. The novel criticizes the intolerance preached by the Bible towards different worldviews and sexualities. It also questions the patriarchal moral system in the Bible and the British society in the seventies and eighties of the

last century by characterizing its women characters as strong independent individuals, more so than their biblical counterparts. In the Book of Ruth, for example, the protagonist is eventually saved by two other men: her new husband, Boaz, and her son, Obed. In *Oranges*, by contrast, Jeanette does not need to be saved by a man; she is finally saved by her faith in her true self.

All individuals have historically adopted certain expected behaviours according to their sex and gender. Consequently, from the time we are born, we are immediately categorized as male or female. This biological assumption may be challenged or disrupted on many occasions as we grow older when ‘gender identity and ‘gender roles’ come to play their crucial part. The queer theory encompasses a broader group of people and serves as a platform for defiance of societal norms. In the case of *Oranges*, these societal norms are epitomized by the rules and rock-solid beliefs set by Jeanette’s mother, the members of their community, and the pastor governing the religious community which Jeanette and her mother are a part of. These societal norms are eventually rejected by Jeanette, which results in her being an outcast in society. But unlike Miss Jewsbury, Jeanette is proud of her lesbian identity and through her quest shows that identity different from others is not an obstacle to reaching happiness and success.

When Winterson’s mother asked her why she had fallen in love with a girl, Winterson answered that she was happy with that

girl. Hearing this, Mrs. Winterson asked, “Why be happy when you could be normal?” (114). This question reveals her mother’s opinion on pursuing true self and desires: pretending to be normal is much more crucial than being happy with your true self or being seen as different. Jeanette is well aware of some of her sisters in her community who engage in homosexual affairs, even though they adamantly deny it.

One crucial example is the exclusion of the photograph of a woman from Jeanette’s mother “Old Flames” (37) page when Jeanette asked about the woman to her mother. The eventual disappearance of this woman from the page suggests that Jeanette’s mother may have experienced same-sex romantic love at one point, which she now seeks to hide. But Jeanette is not willing to live a life of lies and masks, like most other people in her community including her mother and the pastor, who knows only to preach rather than practice.

Ultimately, the complication of identity, and all of the defiance of societal norms that comes with it, eventually make the gender identity what it is: not straightforward, and not fixed. Stories and history are constantly being performed, changed and evolved, so are identities. Contrary to the beliefs of her congregation, Jeanette firmly believes that her spiritual and sexual lives can coexist as a part of her gender identity. Thus, the protagonist’s construction of her gender identity through various

fairytale, biblical allusions and narratives come across as a symbol of queer resolution: “It’s is a way of explaining the universe while leaving the universe unexplained”. (91)

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MAZES

Shijimol K.S

Department of Mathematics

ABSTRACT

Maze is a graphical puzzle that consists of complex structures with a series of interconnecting pathways the goal of which is to connect the starting point with the finishing point by a single route. Solving mazes opens the mind to critical thinking. To study mazes, one must first have an efficient way of creating different mazes. This project deals with different algorithms for maze generation.

MAZE GENERATION ALGORITHM

Maze generation is an act of designing the layout of passages and walls within a maze. There are many different approaches to generating mazes with various maze generation algorithms like the Depth-first search algorithm (DFS), Kruskal's algorithm, Prim's algorithm for building them, either by hand or automatically by a computer.

KRUSKAL'S ALGORITHM

Joseph Kruskal invented this minimum spanning tree creation algorithm in 1956. To carry out this algorithm, first, arrange the edges of the graph G based on their weights. Next, create a forest T that contains all of the edges that are unconnected

to each other. Then, successively as many as $n-2$ times, add the least edge into T so that no circuits are formed. In the end, is a minimum spanning tree form.

Input: A connected weighted graph with vertices.

Output: A minimal spanning tree form.

Step 1: Arrange the edges in order of increasing weights.

Step 2: Select the edge with minimum weight (If there is more than one edge with minimum weight arbitrary choose one of these edges).

Step 3: Proceed sequentially adding each edge of (next) minimum weight which does not result in a cycle until $n-1$ edge is included

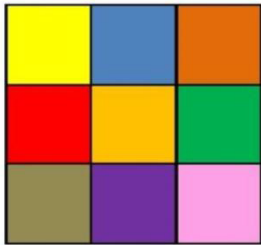
Step 4: Exit with a minimal spanning tree.

KRUSKAL'S ALGORITHM FOR GENERATING MAZE

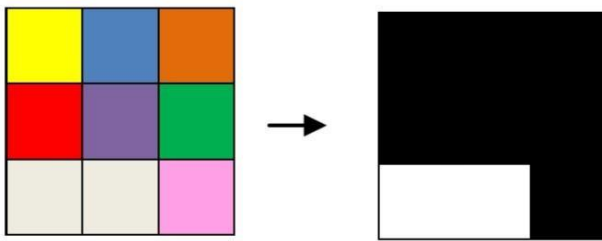
The algorithm started by creating a forest of all nodes in the cells matrix. Then, select a random edge (wall between two cells) and add it with two cells that are connected with it to the maze, creating a tree or a set of cells. After that, select another random edge that doesn't connect two cells in the same "tree" and add it to the maze. The process is finished when there are no edges left to be selected, or there is only one tree remaining in the cell matrix.

Example 1.3.2: A 3x3 maze generation by Kruskal's algorithm. The first step is creating a 3x3 cells matrix with a forest

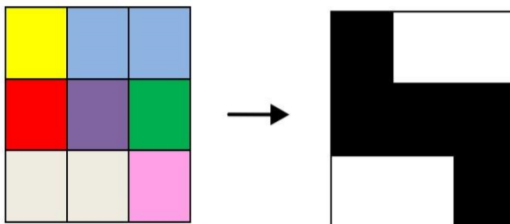
of 9 disjoint trees (in this case, 9 nodes). Note that different colours represent different trees or sets of cells.



Next, add a random edge from the matrix to the maze. In this case, the added edge is the edge between cells (2,2) and (2,1).

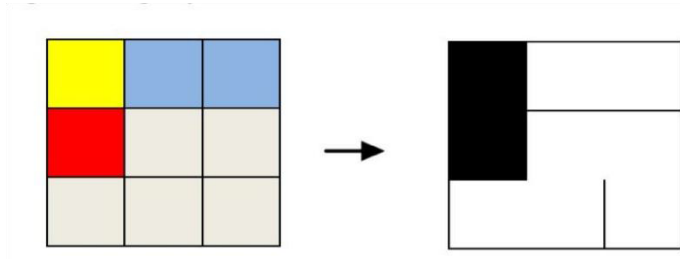


Note that when an edge is added, two cells that are connected to it are unified into a single tree. Now, let's add another edge to the maze.



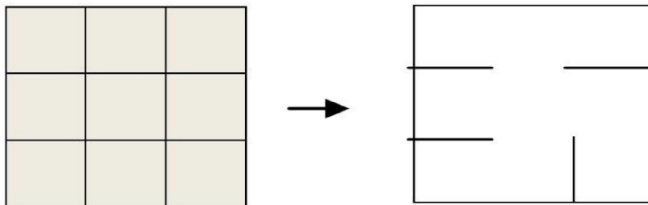
Keep adding more edges until there is only one tree remaining in the matrix.

Now add the edge between (2,2) and (3,2) so that the orange and grey trees are unified into one tree.

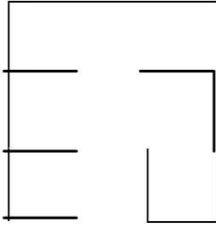


Again, add more edges.

At this point, the process is not yet stopped because there are still two trees left behind in the matrix. The adding of the edge between (1, 2) and (2, 2) unify the trees and hence, marks the final step of the algorithm.



Finally, add random start and finish points to complete the maze.



MAZE SOLVING ALGORITHMS

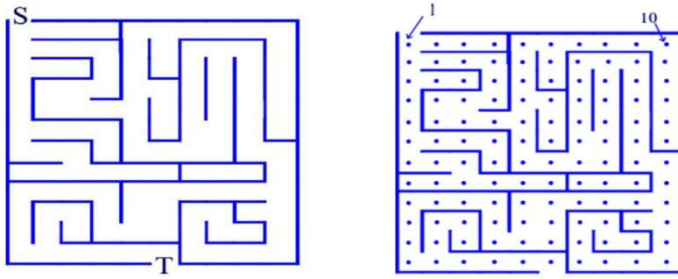
Maze solving is a minor challenge for the analytical minds of humans. There are a lot of algorithms for solving mazes fastly. Here we discuss maze solving by BFS algorithm.

MAZE SOLVING BY BREADTH-FIRST SEARCH ALGORITHM

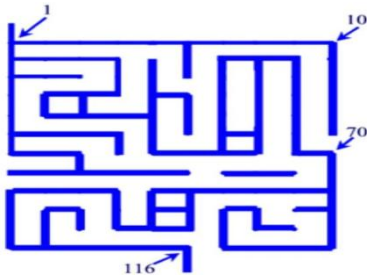
Breadth-first search is a graph traversing technique. According to this technique, we select a root node and add it into a queue. Then, we will add its neighbours into the queue (from the rear) and will remove one more element from the queue (from the front) and will add its neighbours into the queue. This way, we traverse the whole graph.

Now, we consider that this technique of graph traversal can be easily used to solve a maze. What you have to do is that you have to convert the whole maze into a graph. And, this is how you have to do it:

1. Consider the following maze



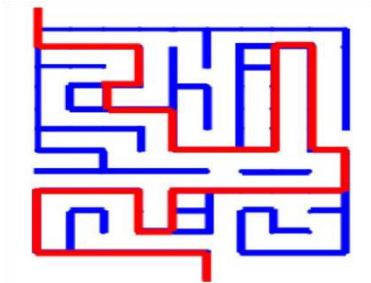
2. Now, consider cell 1 and you can see that it has three openings: top, right, and bottom. So, in the graph, instead of a cell, we will represent 1 by a dot and join this dot with the top, right and bottom cell (dot in case of a graph). The following illustration will explain the concept to you in full detail.



3. So, we have made our graph. Now, as we do in regular breadth-first search, we will keep on adding elements into the queue and removing them and at the same time adding their neighbours into the queue. After all the vertices of the graph are traversed, we will backtrack the traversed vertices, following their origin vertices and we will get different paths (if more than one

path exists) to the target and the one with a lesser number of traversed vertices will be a shorter one.

4. The above example has only two ways to the target (116) and the shortest path will be:



The advantage of this algorithm above all algorithms is that it gives you the shortest path from any number of possible paths in a maze.

Entertainment and brain training may be considered as the primary goals of maze application. So-called logic mazes are special mazes with specifically defined rules altering the usual way of maze solving. This typically involves rules regarding step sequence constraints, moving through some predefined checkpoints, etc.

In some countries (e.g., USA) there is a tradition to build life-size mazes and promote them as tourist attractions. Some life-size mazes in the world are Glacier maze in Glacier national park, Trap maze in Washington etc. Another application of mazes can be found in the video game industry. Often there is a demand for random creation of interior and/or exterior environment. For

example, in the case of creating an interior ground plan, maze cells can be mapped into rooms and maze paths into doors. Mazes were also an inspiration for many movies, e.g., *Labyrinth* (1986).

Commonly mazes are used for entertainment. Mazes are a simplified form of navigation. Developments used in efficient maze solving have helped navigation problems like,

- The process or activity of accurately ascertaining one's position and following a route
- The passage of ships
- The action of moving around a website, the internet etc.

Application of maze solving system includes intelligent traffic control that helps ambulances and firefighters for rescue operations to find the shortest path to their destination. If we use roots for maze solving it will help to bomb-sniffing and finding humans in the wreckage and also help in military operations in terrorist attacks. In the medical field, mazes are the complicated system of interesting paths used in intelligence tests and behavioural experiments involving learning.

Mazes are also used in studying traffic flow on city streets (including neighbourhoods and parking lots and garages because they are modified grids), and to meet urgent requirements, as well as real-world searches of any kind, the possibilities are endless.

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ROUGH SET THEORY

Evina Joy

Department of Mathematics

ABSTRACT:

Rough set theory is a new mathematical tool for dealing with vague, imprecise, inconsistent and uncertain knowledge. In this paper, the basic concepts, operations and characteristics of the rough set theory are introduced. Also, the concept of approximation spaces is discussed.

INTRODUCTION:

The problem of imperfect knowledge has been tackled for a long time by philosophers, logicians and mathematicians. There are many approaches to the problem of how to understand and manipulate imperfect knowledge. Rough set theory is an attempt at this problem. Rough set theory was introduced by Zdzislaw Pawlak in 1982. Ever since it was introduced, many attempts were made to generalize rough sets. Rough set theory is an approach to vagueness similar to fuzzy set theory. It is not classical theory but it is embedded in it. Rough set theory can be viewed as a specific implementation of Frege's idea of vagueness that is imprecision

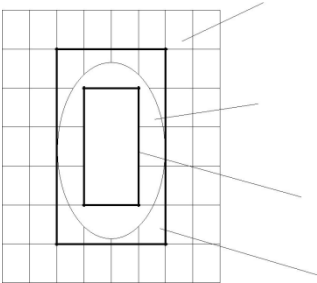
in this approach is expressed by a boundary region of a set, and not by a partial membership like fuzzy set theory.

The rough set concept can be defined quite generally through topological operations, closure and interior, called approximations. Every object of the universe of discourse is associated with some information. For example, if objects are patients suffering from a certain disease, symptoms of patients form information about patients. Object characterized by the same information is indiscernible given the available information about them.

Suppose we are given a set of objects U called the universe, and the relation $R \subset U \times U$ representing our lack of knowledge about elements of U . Let X be a subset of U we want to characterize the set X with respect to R . A set is a Rough set (imprecise) if it has non-empty boundary region. Otherwise, the set is crisp (precise).

As we see the definition of approximations is expressed in terms of granules knowledge. The lower approximation of a set is the union of all granules which are entirely included in the set X . And the upper approximation is the union of granules that have a non-empty intersection with the set. The boundary region is the difference between the upper and lower approximation.

Set of objects



If the boundary region of X is the empty set, i.e., $BN_R(X) = \emptyset$, then the set X is crisp with respect to R ; in the opposite case, i.e., if $BN_R(X)$ the set is referred to as rough with respect to R . Thus, any rough set-in contrast to a crisp set, has a non-empty boundary region.

Accuracy of Approximation

Rough set can be also characterized numerically by the following coefficient $\alpha_R(x) = \frac{|apr_R(x)|}{|apr_R(x)|}$ is called the accuracy of the approximation, where denote the cardinality of X . Suppose we are given data about 6 patients as shown in table 1:

Flu	Temperature	Muscle-pain	Head ache	Patient
Yes	High	Yes	No	P1
Yes	High	No	Yes	P2
Yes	very high	Yes	Yes	P3
No	Normal	Yes	No	P4
No	High	No	Yes	P5
Yes	very high	Yes	No	P6

Columns of the table 1 are labelled by attributes (symptoms) and rows by objects (patients), where entries of the table are attributes values. Thus, each row of the table can be seen as information about specific patients.

For example, P2 can be characterized in table by the following attribute set.

(Headache, Yes), (Muscle pain, No), (Temperature, High), (Flu, Yes) which forms a piece of information about the patient. In the table patients P2, P3 and P5 are indiscernible with respect to the attributes *Headache*, patients P3 and P6 are indiscernible with respect to attributes *Muscle-pain*, and *Flu*, and patients P2 and P5 are indiscernible with respect to attributes *Headache*, *Muscle-pain* and *Temperature*.

Hence, For example, the attribute *Headache* generates 2 elementary sets $\{P2,P3,P5\}$ and $\{P1,P4,P6\}$ whereas the attributes *Headache* and *Muscle-pain* form the elementary sets: $\{P1,P4,P6\}, \{P2,P5\}$ and $\{P3\}$. Similarly one can define elementary sets generated by any subset of attributes.

Now consider the set X to be the patients suffering from flu, then $X = \{P1, P2, P3, P6\}$. Patient P2 suffers from flu whereas P5 does not, and they are indiscernible with respect to the attributes *Headache*, *Muscle-pain* and *Temperature*. Hence flu cannot be characterized in terms of attributes *Headache*, *Muscle-pain* and *Temperature*. Hence P2 and P5 are the boundary-line cases, which cannot be properly classified in view of the available knowledge. The remaining patients P1, P3 and P6 display symptoms which enable us to classify them with certainty as suffering from flu, patients P2 and P5 cannot be excluded as suffering from flu and patient P4 for sure does not suffer from flu, in view of the displayed symptoms.

Thus the lower approximation of the set X is $\{P1,P3,P6\}$ and The upper approximation of the set X is $\{P1,P2,P3,P5,P6\}$, and boundary of X is $\{P2,P5\}$.

Now the accurate approximation of X,

$$\alpha_R(X) = \frac{|apr_R(X)|}{|apr_R(X)|}$$

$$= \frac{|P1,P3,P6|}{|P1,P2,P3,P5,P6|}$$

$$= \frac{3}{5}$$

Rough Membership Function

Rough set can be also defined using a rough membership function, defined as

$$\mu_X^R(x) = \frac{|X \cap R(x)|}{|R(x)|}$$

Obviously

$$\mu_X^R(x) \in [0, 1]$$

The rough membership function can be used to define approximations and boundary region of a set, as shown below:

$$\underline{apr}_R(X) = \{x \in U: \mu_X^R(x) = 1\}$$

$$\underline{apr}_R(X) = \{x \in U: \mu_X^R(x) > 0\}$$

$$BN_R(X) = \{x \in U: 0 < \mu_X^R(x) < 1\}$$

The rough membership function has the following properties:

- 1 $\mu_X^R(x) = 1$ iff $x \in \underline{apr}_R(X)$
- 2 $\mu_X^R(x) = 0$ iff $x \in U - \underline{apr}_R(X)$
- 3 $0 < \mu_X^R(x) < 1$ iff $x \in BN_R(X)$
- 4 if $R(X) = \{(x, x): x \in U\}$, then $\mu_X^R(x)$ is the characteristic function of X,

- 5 if $x R y$, then $\mu_X^R(x) = \mu_Y^R(y)$ provided R
- 6 $\mu_{U-X}^R(x) = 1 - \mu_X^R(x)$ for any $x \in U$
- 7 $\mu_{X \cup Y}^R(x) \geq \max(\mu_X^R(x), \mu_Y^R(y))$ for any $x \in U$
- 8 $\mu_{X \cap Y}^R(x) \leq \min(\mu_X^R(x), \mu_Y^R(y))$ for any $x \in U$

APPROXIMATION SPACE

The notation of approximation spaces is one of the fundamental concepts in the theory of rough sets. We discuss the Pawlak approximation space constructed from an equivalence relation and its generalization using any binary relations.

Pawlak Approximation Space

Let U denote a finite and non-empty set called universe. Let $R \subseteq U \times U$ be an equivalence relation on U . The pair $\text{apr} = (U, R)$ is called a Pawlak approximation space. The equivalence relation R partition the set U into disjoint subsets. Let U/R denote the quotient set consisting of equivalence classes of R . The empty set \emptyset and the elements of U/R are called elementary sets. A finite union of elementary sets, i.e., the union of one or more elementary sets is called a composed set. The family of composed sets is called a cop (apr). It is a subalgebra of the Boolean algebra 2^U formed by the power set of U . A set which is a union of elementary sets is called a definable set. The family of all definable sets is denoted by $\text{Def}(\text{apr})$. For a finite universe, the family of definable sets is the same as the family of composed sets. A Pawlak

approximation space defines uniquely a topological space $(U, \text{Def}(\text{apr}))$, in which $\text{Def}(\text{apr})$ is the family of all open and closed sets. Given an arbitrary set $A \subseteq U$, in general, it may not be possible to describe A precisely in $\text{apr} = (U, R)$. One may characterize A by a pair of lower upper approximations.

Generalized Approximation Spaces

Suppose R is arbitrary relation on U . The pair $\text{apr} = (U, R)$ is called a generalized approximation space or simply an approximation space. With respect to R , we can define mapping such that by collecting all R -related of x . It is an equivalent relation, and sometimes more convenient, representation of a binary relation. If R is indeed an equivalence relation, is the equivalence class containing x . In generalizing definition, one may use in place of the equivalence class. By using different types of binary relations, one obtains a distinct class of approximation spaces.

In some studies, approximation space is defined using covering by exploiting the fact that a covering is a generalization of a partition. One can generalize definitions, by substituting equivalence class with elements of a covering and partition with a covering, to derive approximation spaces. Given reflexive binary relation R , one may define a covering of the universe. Based on these studies different views of rough set theory were introduced:

Covering based rough set theory, Neighborhood-related covering rough sets, Multigranulation rough sets etc.

Rough Set is a method of dealing with domains characterized by inconsistent and incomplete information. Rough Sets is a non-deterministic, machine learning method that generates rules based on examples contained within information tables. Each row within the information table is considered an element, which we represent using the notation (e_1, e_2, e_3, \dots) , within a universe (U) defined by the information table. With the introduction of vagueness, we have to compromise with a few results, as is only to be expected.

Fuzzy set and rough set theory are two different approaches to vagueness and are not remedy for classical set theory difficulties. Both theories represent two different approaches to vagueness. The fuzzy set theory addresses gradualness of knowledge, expressed by the fuzzy membership, whereas the rough set theory addresses granularity of knowledge, expressed by the indiscernibility relation.

The successful application of rough sets depends on a clear understanding of the various concepts involved. There are at least two views that can be adopted for interpreting the theory of rough sets. Both of these views can be explained using the notion of lower and upper approximations in approximations spaces. They

differ from how these approximations are used. If approximations are adopted to construct operators, the operator-oriented view is obtained. The theory of rough sets is therefore an extension of set theory with two additional unary operators. Alternatively, the lower and upper approximations are used to define the notion of rough sets. A rough set can be defined by using either subset of the universe or elements of subsets. Under this interpretation, no additional set-theoretic operators are introduced.

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