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Biological activities of *Annona muricata* and *Syzygium samarangense* leaf powder and leaf extracts against *Sitophilus oryzae* and few microbes

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Abstract
The study was aimed to control *Sitophilus oryzae* using *Annona muricata* and *Syzygium samarangense* plant leaf powder. *Syzygium samarangense* leaf powder had stronger repellent activity when compared to *Annona muricata* leaf powder. *Annona muricata* leaf powder has repellent efficacy of 49.33% in 5 gm concentration. *Syzygium samarangense* have repellent efficacy of about 55.33% in 5 gm concentration exposure. Identification of bioactive compounds and antimicrobial activities were carried out in Petroleum ether and Methanol leaves extract of *Annona muricata* and *Syzygium samarangense* through Gas chromatography mass spectroscopy and well diffusion method. The antimicrobial potential of Petroleum ether and methanol leaf extracts of the selected leaves were screened against eight species of bacteria. The maximum zone of inhibition in Petroleum ether and Methanol leaf extract of *Annona muricata*, were 1.15 ± 0.02mm, were on the observed zone of inhibition in Petroleum ether and Methanol leaf extract of *Syzygium samarangense*, were 1.22±0.04 and 1.05±0.02 respectively when compared to control. GC-MS analysis of Petroleum ether leaf extracts of *Annona muricata* leaves revealed the presence of various bioactive compounds like, Hexadecane, Caryophyllene, Pentadecane,1,2-Benzenedicarboxylic acid, Stigmas-4-En-3-One. GC-MS Analysis of Methanol leaf extract of *Annona muricata* leaves enabled presence of compounds like Neophytadiene, Dibutyl phthalate, 1,2- Benzenedicarboxylic Acid. The Petroleum ether leaf extract of *Syzygium samarangense* enabled presence compounds like Caryophyllene, Alpha-Sellinene, Beta selinene. Alpha -Sellinene, 1,2- Benzenedicarboxylic Acid, Disooctyl phtalate. The Methanol leaf extract of *Syzygium samarangense* showed compounds like Caryophyllene, Beta selinene, Alpha -Sellinene, Dibutyl phthalate, 1,2- Benzenedicarboxylic acid. These findings were focused in order to obtain data that would justify the possible use in the development of new drugs for various disorders and in controlling stored pests.

Keywords: *Sitophilus oryzae*, *Annona muricata*, *Syzygium samarangense*, repellent activity, anti-microbial, gas chromatography and mass spectroscopy

Introduction
Phytochemistry has advanced a lot in recent years because the use of traditional medicines and medicinal plants possess remedial agents for the maintenance of health which is built on prototype chemical substances isolated form plants. somewhere in between natural product organic chemistry and plant biochemistry and is closely related to both. It is concerned with the huge variety of organic substances that are expanded with and accumulated by plants and deals with the chemical structures of these substances, their biosynthesis, turn over and metabolism, their natural distribution and their biological function [1]. Among many plants been reported few plants like *Ocimum sanctum*, *Curcuma longa*, *Annona muricata*, *Syzygium samarangense* and *Aleo barbadensis* have reported cytotoxicity effect towards certain cancer cell lines. Among this one of the important medicinal plants which show many medicinal properties is *Annona muricata* (in Tamil - Mullu seetha) [2,3]. *Syzygium samarangense* a native plant of Andaman and Solomon Island is also cultivated in Asia and the Pacific region. [4,5]. Clinically *Syzygium* genus is reported for its antioxidant, antifungal, cytotoxicity, anti-inflammatory and antimicrobial activities. [6,7]. The rice weevil, *Sitophilus oryzae* is one of the most vital destructive primary pests attacking many common stored cereals including rice, wheat, maize and split peas and has a worldwide distribution [8, 9, 10]. The main advantage of botanicals is that they are easily produced by farmers, and less expensive [11]. The application of botanical insecticides to protect stored products is promising, chiefly due to the possibility of controlling environmental conditions inside the storage units, maximizing the insecticidal effect; in these places the natural product can be used as powder, extract and oil [12]. The need to control the infestation of *Sitophilus oryzae* has become a major issue in damaging the stored products [13]. The present study determined the antimicrobial activity, for few selected gram positive and gram negative bacteria.

Materials and Methods

Plant Collection

The selected leaves of *Syzygium samarangense*, *Annona muricata* were collected from in and around Kerala (India) during May to July 2021. Freshly collected plant parts were dried in sunlight, for 20-25 days. Dried samples were separately crushed and ground into fine powder using electric blender [14].

Preparation of Extracts

The fresh leaves of *Annona muricata* and *Syzygium samarangense* were collect from surroundings of Thikkodi Gramapanchayath. The leaves were clean, dried in sunlight, ground into powder, and kept at 20ºC for further studies. The leaf powder of 30 g was extracted in 100 ml methanol or petroleum ether in Soxhlet extraction apparatus at 60ºC for 48 hrs. The crude extract was filtered, evaporated under reduced pressure at 70 ºC in a rotary vacuum evaporater.

Collection of *Sitophilus oryzae*

Sitophilus oryzae collected from milled rice, from kerala during months of August to September 2021.

Repellent Activity

Repellent Test of Plant Leaf Powders

The effects of plant powders on repellence were conducted by a cone bioassay. Forty gms of milled rice were mixed with the *Annona muricata* powders at 1g, 2 g, 3 g, 4 g, and 5 g or with *syzygium samarangense* powder at 1g, 2g, 3g, 4g, and 5g. The admixed grains were put in a small plastic bottle. The cone was rested on the mouth of a bottle which was placed on a plate. Ten adult rice weevils were introduced into the middle of admixed grains. After 5,10,15 and 20 hr, the weevils those escaped from the cone were counted. Unmixed rice grains were used as controls. The tests were done in triplicate and three repeats.

Microbial Cultures

Microbes used for present study were, *Staphylococcus aureus, Klebsiella species, Salmonella paratyphi, E. coli, Serratia species, Micrococcus luteus, Proteus mirabilis and Pseudomonas aeruginosa.* All Bacteria were purchased from P.S.G Institute of Medical Sciences and Research

Agar Well Diffusion Method

The antibacterial activity of various extract of *Annona muricata* and *Syzygium samarangense* was determined by using agar well diffusion technique. For this 25 ml of sterile Muller-Hinton agar No.2 (Hi Media), was poured in sterile autoclaved Petri plates, before pouring 100µl activated bacterial culture was added, and then allowed to stand for solidification completely. The well was prepared with the help of sterile 6mm diameter cork-borer. Then 100µl of prepared crude extract (60mg/ml) solution were poured in to the wells. Then the plates were sealed with plasticize and transferred to refrigerator to diffuse out of 30 min. The plates were then incubated at 37ºC for 24 hrs. Triplicate plates were prepared for each treatment and the average zone of inhibition excluding well, were recorded. 0.01mg/mL Streptomycin was used as positive control. Inoculum's turbidity was maintained constant throughout the experiment to 0.8 OD at 660nm.

Gas chromatography-mass spectrum (GC-MS) analysis

The GC-MS analysis of the plants extract (*Annona muricata* and *Syzygium Samarangense* was made in an Agilent 7890A instrument under computer control at 70eV. About 1 µl of the methanol and petroleum ether extract and Methanol extract was injected into the GC-Ms using a micro syringe and the scanning was done for 45 min. As the compounds were separated, they eluted from the column and entered a detector which was capable of creating an electronic signal whenever a compound was detected. The greater the concentration in the sample, bigger was the signal obtained which was then processed by a computer. The time from the injection was made (Initial time) to when elution occurred is referred to as the retention time (RT). The M/Z (mass /charge) ratio obtained was calibrated from the graph obtained, which was called as the mass Spectro graph which is the fingerprint of a molecule. Before analysing the extract using gas chromatography and mass spectroscopy, the temperature of the oven, the flow rate of the gas at 100°c. Helium gas was used as a carrier as well as an eluent. The flow rate of helium was set to 1 ml/min. Compounds were identified by comparing their spectra to those of the Wiley and NIST/EPA/NIH mass spectral libraries.

Statistical Analysis

All experiments were performed in triplicate and data are the Mean± S.E. Data were subjected to one-way analyses of variance (ANOVA). The means were separated using the Duncan multiple rank tests when ANOVA was significant ($P<0.05$).

Resuls

Repellent Activity

Annona muricata leaf powder have repellent efficacy of 49.33% in 5 gm concentration. No effects were occurred in 5 and 10 hrs at 1 gm concentration. In 15 hr, at 1 gm concentration, 11.00% of repellency occurred. In 20 hr, at 1 gm concentration, 21.00% of repellency occurred.

Syzygium samarangense leaf powder have repellent efficacy of about 55.33% in 5 gm concentration exposure. No effects were occurred in 5 hr at 1 gm concentration. In 10 hr, at 1 gm concentration, 10.33% of repellency occurred. In 15 hr, at 1 gm concentration, 25.33% of repellency occurred. In 20 hr, at 1 gm concentration, 31.00% of repellency occurred. (Table-1 &Table-2).

Antimicrobial Activity

The leaf extract of *Annona muricata* and *Syzygium samarangense* showed good inhibitory effect on the tested Gram-Positive and Gram-negative human pathogens (Table-3,4,5, 6). The antimicrobial activity assayed were 60 µl concentration in all crude extracts of *Annona muricata* and *syzygium samarangense*. The present study were done against few human pathogens of Gram-positive and Gram-negative bacteria. Gram positive bacteria -*Staphylococcus aureus* and *Micrococcus luteus.* Gram negative bacteria -*Klebsiella species, Pseudomonas aeruginosa, Serratia marcescens, E. coli, Proteus mirabilis* and *Salmonella paratyphi b.*

The maximum zone of inhibition in Petroleum ether leaf extract of *Annona muricata* observed were 1.15 ± 0.02 in *E. coli*, followed by *Klebsiella species* – 0.70±0.04. When compared to control, all bacteria showed very less zone of inhibition (Table-3). The maximum zone of inhibition in Methanol leaf extract of *Annona muricata* observed were 1.25 ± 0.02 in *Staphylococcus aureus*, followed by *Micrococcus luteus* – 1.10±0.04, *E. coli* – 0.90±0.04, *Klebsiella species* – 0.86± 0.33, *Pseudomonas aeruginosa –0.65±0.028, Salmonella paratyphi b*, *Proteus mirabilis – 0.60±0.20.* When compared to control, all bacteria showed very less zone of inhibition (Table-4). The maximum zone of inhibition in Petroleum ether leaf extract of *Syzygium samarangense* observed were, 1.22±0.04 in *Klebsiella species*, followed by 1.15±0.02 in *Staphylococcus aureus*, 0.85±0.028- *Micrococcus luteus*, 0.775±0.028- *E. coli*, 0.65±0.05- *Proteus mirabilis.* When compared to control, all bacteria showed very less zone of inhibition (Table-5). The maximum zone of inhibition in Methanol leaf extract of *Syzygium samarangense* observed were, 1.05±0.02 in *Micrococcus luteus*, followed by 0.85±0.02 in *Staphylococcus aureus*, 0.81±0.04 -*Pseudomonas aeruginosa*, 0.775±0.028-E-coli, *Klebsiella species-0.75±0.02*, 0.55±0.028- *Proteus mirabilis.* When compared to control, all bacteria showed very less zone of inhibition (Table-6).

GC-MS Analysis

GC-MS analysis were used to identify the most prevailing volatile compounds present in *Annona muricata* and *Syzygium samarangense* leaves. The explored phytocompounds was established based on the peak, molecular weight, molecular formula, and retention time and area percentage. Among compounds identified by GC-MS screening were assessed for their biological property using physical and chemical property calculations according to Tice Rules. As per the Tice rule, if molecular weight is within ≥ 150 and ≤ 500; Theoretical logarithm of the noctanol/ Water Partition co- efficient (109 P) is less than or equal to 5.0 hydrogen bond acceptor is within 1-8, hydrogen bond donor is less than or equal to 2 and number of rotatable bonds is less than or equal to 12 then compounds are considered as antimicrobial anti- cancerous, anti – insect, antifeedant and anti-oxidant potential compounds for novel drug GC-MS analysis of Petroleum ether extracts of *Annona muricata* leaves enabled the presence of 5 components. The extract consists of a mixture of different classes of compounds. The mass spectrum were compared with WILEY, TUTORIAL and REPLIB spectral library. The constituents were found to be Hexadecane (11.15%), Caryophyllene (1.79%), Pentadecane (3.49%), 1,2 Benzenedicarboxylic acid (68.61%) and Stigmast-4-En-3–one (100%). Compounds in Petroleum ether leaf extract of *Annona muricata* were identified by GC-MS analysis on the basis of retention time (RT) [Table-7]. GC-MS Analysis of Methanolic extract of *Annona muricata* enabled presence of 18 compounds. The major components were found to be Neophytadiene (0.27%), Dibutyl phthalate and (3.35%), 1,2 Benzenedicarboxylic acid (96.39%). Compounds in Methanol leaf extract of *Annona muricata* were identified by GC-MS analysis on the basis of retention time (RT) [Table-8]. The petroleum ether extract of *Syzygium samarangense* enabled presence of 6 compounds. The major compounds were found to be Caryophyllene (7.64%), Alpha -Sellinene (4.34%), Beta selinene (14.95%), Alpha Sellinene (18.12%), 1,2 Benzenedicarboxylic acid (10.35) and Disooctyl phthalate (44.61%). Compounds in Petroleum ether leaf extract of *Syzygium samarangense* were identified by GC-MS analysis on the basis of retention time (RT) [Table-9]. The Methanol extract of *Syzygium samarangense* enabled 5 compounds. The major compounds were found to be Caryophyllene (1.06%), Beta selinene (1.24%), Alpha-Sellinene (1.21%), Dibutyl phthalate (7.28%) and,1,2 Benzenedicarboxylic acid (89.21%). Compounds in Syzygium *samarangense* methanol leaf extract were identified by GC-MS analysis on the basis of retention time (RT) [Table-1].

Table 1: Repellent activities of *Annona muricate* leaf powder, on adult weevils in milled rice grains

Concentration %	% Mortality of adult rice weevils (Mean ± S.E)			
	5 hr	10 hr	15hr	20 hr
1 gm	0.00±0.00	0.00±0.00	11.00±0.57^{c}	21.00±0.57^{a}
2 gm	0.00±0.00	21.33±0.88^{c}	35.66±0.33^{b}	44.66±0.66^{b}
3 gm	0.00±0.00	31.33±0.88^{c}	40.33±0.333^{b}	47.00±0.57^{d}
4 gm	0.00±0.00	40.33±0.33^{b}	44.66±0.33^{e}	47.66±0.57^{a}
5 gm	0.00±0.00	45.66±0.33^{b}	46.66±0.66^{b}	49.33±0.33^{a}
Control	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00

a-f means within a column followed by different letters are significantly, P<0.05, Duncan multiple rank test (DMRT).

Table 2: Repellent activities of *Syzygium samarangense* leaf powder, on adult weevils in milled Rice grains

Concentration %	% Mortality of adult rice weevils (Mean ± S.E)			
	5 hr	10 hr	15hr	20 hr
1 gm	0.00±0.00	10.33±0.33^{d}	25.33±0.33^{d}	31.00±1.00^{c}
2 gm	21.00±0.57^{b}	25.33±0.33^{c}	25.66±0.33^{a}	35.66±0.33^{a}
3 gm	31.33±0.66^{b}	35.66±0.33^{c}	40.00±0.33^{d}	45.33±0.33^{d}
4 gm	36.66±0.88^{e}	37.66±0.33^{e}	42.33±0.33^{c}	51.00±0.57^{a}
5 gm	41.00±0.57^{a}	45.33±0.33^{c}	50.66±0.33^{c}	55.33±0.33^{e}
Control	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00

a-f means within a column followed by different letters are significantly, P<0.05, Duncan multiple rank test (DMRT).

Table 3: Zone of inhibition formed by bacteria in Petroleum ether leaf extract of Annona muricata at 60µl concentration

Bacterial Name	Zone of inhibition (mm)	Amoxicillin (Control)
Proteus mirabilis	0.00±0.00	12.00±0.51
Staphylococcus aureus	0.00±0.00	28.22±1.11
Klebsiella species	0.70±0.04	25.00±1.80
Salmonella paratyphi b	0.00±0.00	17.28±5.76
E. coli	1.15±0.028	21.41±0.81
Serratia marcescens	0.00±0.00	12.51±0.91
Pseudomonas aeruginosa	0.00±0.00	25.00±1.80
Micrococcus luteus	0.00±0.00	16.00±2.71

Table 4: Zone of inhibition formed by bacteria in Methanol leaf extract of *Annona muricata* at 60µl concentration

Bacterial Name	Zone of inhibition (mm)	Amoxicillin (Control)
Proteus mirabilis	0.60±0.20	12.00±0.51
Staphylococcus aureus	1.25±0.025	28.22±1.11
Klebsiella species	0.86±0.33	25.00±1.80
Salmonella paratyphi b	0.65±0.028	17.28±5.76
E. coli	0.90±0.04	21.41±0.81
Serratia marcescens	0.00±0.00	12.51±0.91
Pseudomonas aeruginosa	0.75±0.028	25.00±1.8
Micrococcus luteus	1.10±0.04	16.00±2.71

Table 5: Zone of inhibition formed by bacteria in Petroleum ether leaf extract of *Syzygium samarangense* at 60µl concentration

Bacterial Name	Zone of inhibition (mm)	Amoxicillin (Control)
Proteus mirabilis	0.65±0.05	12.00±0.51
Staphylococcus aureus	1.15±0.028	28.22±1.11
Klebsiella species	1.225±0.04	25.00±1.80
Salmonella paratyphi b	0.00±0.00	17.28±5.76
E. coli	0.775±0.028	21.41±0.81
Serratia marcescens	0.00±0.04	12.51±0.91
Pseudomonas aeruginosa	0.00±0.00	25.00±1.8
Micrococcus	0.85±0.0028	16.00±2.71

Table 6: Zone of inhibition formed by bacteria in Methanol leaf extract of *Syzygium samarangense* at 60µl concentration

Bacterial Name	Zone of inhibition (mm)	Amoxicillin (Control)
Proteus mirabilis	0.55±0.028	12.00±0.51
Staphylococcus s aureus	0.85±0.028	28.22±1.11
Klebsiella species	0.75±0.028	25.00±1.80
Salmonella paratyphi b	0.00±0.00	17.28±5.76
E coli	0.77±0.04	21.41±0.81
Serratia marcescens	0.00±0.00	12.51±0.91
Pseudomonas aeruginosa	0.81±0.04	25.00±1.8
Micrococcus	1.05±0.028	16.00±2.71

Table 7: GCMS analysis of Petroleum ether leaf extract of *Annona muricate*

Sl. No.	R time	Compound name	Molecular weight	Molecular formula	Xlogp3	HBD	HBA	RBC	Area %
1	12.691	Hexadecane	226.44	$C_{16}H_3O_4$	8.3	0	0	13	11.15
2	13.434	Caryophyllene	204.35	$C_{15}H_{24}$	4.4	0	0	0	1.79
3	15.059	Pentadecane	212.41	$C_{15}H_{32}$	7.7	0	0	12	14.95
4	34.483	1,2-Benzenedi carboxylic Acid	166.13	$C_8H_6O_4$	0.7	2	4	2	3.49
5	35.217	Stigmast-4-En-3-One	412.7	$C_{29}H_4O_8$	9.3	6	1	0	14.96

Table 8: GCMS analysis of Methanolic leaf extract of *Annona muricate*

Sl. No.	R time	Compound name	Molecular weight	Molecular formula	Xlogp3	HBD	HBA	RBC	Area %
1	26.610	Neophytadiene	278.5	$C_{20}H_3O_8$	9.6	0	0	13	0.27
2	29.253	Dibutyl Phthalate	278.34	$C_{16}H_{22}O_4$	4.7	0	4	10	7.28
3	39.229	1,2-Benzenedicarboxylic Acid	166.13	$C_8H_6O_4$	0.7	2	4	2	89.21

Table 9: GCMS analysis of Petroleum ether leaf extract of *Syzygium samarangense*

Sl. No	R time	Compound name	Molecular weight	Molecular formula	Xlogp3	HBD	HBA	RBC	Area %
1	13.441	Caryophyllene	204.35	$C_{15}H_{24}$	4.4	0	0	0	7.64
2	14.746	Alpha -Sellinene	204.35	$C_{15}H_{24}$	5.2	0	0	0	4.34
3	15.059	Beta -Sellinene	204.35	$C_{15}H_{24}$	5.4	0	0	12	14.95
4	15.262	Alpha Sellinene	204.35	$C_{15}H_{24}$	5.2	2	0	2	18.12
5	34.483	1,2-Benzenedicarboxylic Acid	166.13	$C_8H_6O_4$	0.7	2	4	2	149.00
6	35.217	Diisooctyl Phtalate	390	$C_{24}H_{38}O_4$	8.5	0	4	16	149

Table 10: GCMS analysis of Methanolic leaf extract of *Syzygium samarangense*

Sl. No	R time	Compound name	Molecular weight	Molecular formula	Xlogp3	HBD	HBA	RBC	Area %
1	17.134	Caryophyllene	204.35	$C_{15}H_{24}$	4.4	0	0	0	1.06
2	18.856	Beta Sellinene	204.35	$C_{15}H_{24}$	5.4	0	0	1	1.24
3	19.068	Alpha Sellinene	204.35	$C_{15}H_{24}$	5.2	0	0	1	1.21
4	29.222	Dibutyl -Phthalate	278.34	$C_{16}H_{22}O_4$	4.7	0	4	10	7.28
5	39.214	1,2-Benzenedicarboxylic Acid	166.13	$C_8H_6O_4$	0.7	2	4	2	89.21

Discussion

Repellents prepared from plant products can protect against the pest with reduced impact on the ecosystem. Plant derived repellents can minimize pesticide residue and can pave way for an eco-friendly pest control [15]. The insect repellent components present in *Annona muricata* and *Syzygium samarangense* showed repellency on adult insect *Tribolium castaneum*, *Sitophilus granarius*, and *Rhyzopertha dominica*, also has been reported for its repellent activity against *S. sitophilus, Oryzaephilus Surinamese's, Cryptolestes ferrugineus, orcyra cephalonica* under laboratory conditions. Combination of *Annona muricata* and *Syzygium samarangense* leaf powder with mustard oil found delayed and suppressing emergence of *S. oryzae* pest in milled rice. Plant-based repellent can protect against the pest with minimal impact on the ecosystem, as they keep the insect pest away from the food products by stimulating olfactory or other receptors. Plant derived repellents are safe in pest control and able to minimize pesticide residue. The safety of the people, food, and environment are also guaranted [16]. Antimicrobial activities are related with several phenolics, which can kill bacteria or suppress their virulence and will decrease the microbial growth, enzyme inhibition, etc [17]. *Syzygium samarangense* leaves extract showed

antimicrobial activity towards a wide range of bacteria such as *Escherichia coli, Klebsiella pneumoniae, Pseudomonas Aeruginosa*, few species of *Salmonella* and *Shigella* [18]. Recent evaluation of leaf extract of *Jambu semarang* showed growth inhibition towards *E. coli* [19]. The methanol extract of the *Annona muricata* plant leaf showed antibacterial activity towards gram negative and gram positive bacteria [20]. The petroleum ether and chloroform leaf extracts of plant *Aegle marmelos* possess antibacterial activity against *Staphylococcus aureus, Klebsiella sp,* and *E. coli,* [21]. Methanol hot water extract of jatropha and chloroform extract of lemon grass showed the highest antibacterial activity *Klebsiella sp* [22]. The present GC-MS study is in par with the work carried out by some researchers. Ethyl acetate and methanol crude extract of *Syzygium polyanthum* showed the presence of nine compounds nerolidol, caryophyllene oxide, farnesol, phytol, squalene, β tocopherol, γ tocopherol, α tocopherol and β sitosterol but the major compound observed in methanolic and hexane extracts of *Syzygium polyanthum* leaves were found to be Squalene [23]. The active compounds identified through GC-MS analysis from *Annona muricata* by were 4H-Pyran-4- one, 2,3-dihydro-3,5-dihydroxy-6, Tetradecanoic acid, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, Hexadecanoic acid methyl ester, n-Hexadecanoic acid, Phytol and Octadecanoic acid. Bicyclo Hepta-2, 4- dien, Octadecanoic acid, Stearic acid and Octadeca-9, 12-dienoic acid [24]. Leaf extract of methonal J. adhatoda reported the presence of 13 compounds, among them the major constituents were Amrinone, n- Hexadecanoic acid, Phytol, 9,12,15- Octadecatrienoic acid, (Z, Z, Z)- along with other minor constituents [25]. Eicosane, 1,2-benzenedicarboxylic acid, diisooctyl ester, n hexadecanoic acid and ethyl ester were the compounds identified methanol extract of *Cassia italica* leaf [26]. After a 24 h exposure to eugenol from *Ocimum gratissimum* same repellence were recorded against rice weevil and at concentrations of 0.15% and 0.2% [27]. Notable repellent activity was noted on *Sitophilus oryzae* against essential oils and compounds extracted from plants of Apiaceae family. Strong fumigant toxicity were observed against *S. oryzae* when treated with leaf extracts of *Carum carvi, Cuminum cyminum* and *Anethum graveolens* [28].

Conclusion

Medicinal Plants are a potent source of human health, because of active compounds. The antimicrobial studies demonstrated that among the methanol and petroleum ether solvent extracts, Petroleum ether showed highest antimicrobial property. Even though the selected plant *Annona muricata* and *Syzygium samarangense* showed the presence of few major compounds such as Hexadecane, Caryophyllene, Pentadecane. Neophytadiene, Dibutyl phthalate, Alpha -Sellinene, Beta selinene, Dibutyl phthalate and 1,2 Benzenedicarboxylic acid. Stronger extraction capacity of Petroleum ether and methanol could have been produced number of active constituents responsible for many biological activities. The present work with botanical products is to control the insect pest of stored grain *Sitophilus oryzae*. The results clearly showed that the application of plant-based products as alternative to synthetic chemicals is proven to be more effective, sustainable and safe with low toxicity effect on non-target organisms. Hence it can be concluded that the leaves of *Annona muricata* and *Syzygium samarangense* would direct to the formation of some compounds that could be used to invent new and more potent antimicrobial drugs of natural origin.

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