



PRELIMINARY SCREENING OF ETHNOMEDICINAL PLANTS FOR ANTIFUNGAL ACTIVITY

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ABSTRACT

Based on the ethno botanical survey, 285 solvent extracts from 57 ethno medicinal plants belonging to 55 genera and 34 families were subjected to preliminary screening for antifungal activity against *Candida albicans* and *Fusarium udum* using the agar well diffusion method at concentrations of 5 & 2.5 mg/ml. Among 57 plants, some plants extracts exhibited very effective, effective, moderate and weak activity against *Candida albicans* and *Fusarium udum*. Among the plants tested, maximum activity was observed in all the solvents extracts of *Argemone mexicana*, *Allium sativum*, *Lantana camara*, *Tephrosia purpurea* and *Withania somnifera*. The results of the present study indicate that the extracts of different parts of 57 ethnomedicinal plants have more potential of antifungal activity and are concentration dependent. The demonstration of a broad spectrum of these plants may help to discover new chemical classes of antibiotic substances that could serve as selective agents for infectious disease chemotherapy and control.

KEY WORDS: Preliminary screening, Ethnomedicinal plants, *Candida albicans*, *Fusarium udum*.



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INTRODUCTION

Fungal diseases represent a critical problem to health and they are one of the main causes of morbidity and mortality worldwide^{1, 2}. Although a large number of antimicrobial agents have been discovered, pathogenic microorganisms are constantly developing resistance to these agents³. Antibiotics are sometimes associated with side effects, whereas there are some advantages of using antimicrobial compounds of medicinal plants. The later has fewer side effects, better patient tolerance, relatively less expensive, acceptance due to a long history of use and being renewable in nature⁴. The activity of plant extracts on bacteria and fungi has been studied by a very large number of researchers in different parts of the world^{5, 6}. As a result, antifungal therapy is playing a greater role in health care and the screening of traditional plants in search of novel antifungals is now more frequently performed⁷. The selection of crude plant extracts for screening programs has the potential of being more successful in the initial steps than the screening of pure compounds isolated from natural products⁸. *Candida albicans* is the most common species associated with candidiasis and is the most frequently recovered species from hospitalized patients^{9, 10, 11}. *Fusarium udum* is a pathogenic fungi causing wilt in pigeon pea. Bioefficacy of plant extracts against *F. udum* species has been studied by various workers. The treatment of mycoses has lagged behind bacterial chemotherapy and fewer antifungal than antibacterial substances are available^{12, 13}. Therefore, a search for new antifungal drugs is extremely necessary^{14, 15, 16}.

MATERIALS AND METHODS

(i). Collection of plant material

Based on the ethno botanical survey and the related literature, 57 ethno medicinal plants belonging to 55 genera and 34 families were collected from different localities of Hyderabad Karnataka region during the month of June, July, August and late September. The different plant parts like, leaves, roots, flowers, fruits and stem bark collected were initially rinsed with

distilled water to remove soil and other contaminants, shade dried using tray under controlled temperature at 37°C for a week.

(ii). Extraction of plant material by Soxhlet apparatus

The plant parts were collected and powdered using mechanical pulverize. 250g of plant powder was weighed and subjected to successive Soxhlet extraction with different solvents such as, petroleum ether, chloroform, ethyl acetate, methanol and distilled water (Aqueous) in the order of increasing polarity of solvents for a period of 18-22 h. The extracts obtained were concentrated to dryness in an evaporating dish at 40°C and stored the dried extract at 4°C in the refrigerator until further use. For preparing the drug solution, petroleum ether, chloroform, ethyl acetate, methanol and aqueous crude extracts were dissolved in DMSO to a final concentration of 5mg/ml and 2.5 mg/ml. Fluconazole at 500µg/ml concentration in DMSO was used as a Positive control and DMSO used as negative control. These solutions were preserved at 4°C until further use. In vitro antifungal activity of 57 ethno medicinal plants was carried out by adopting the agar well diffusion technique¹⁷.

(iii). Test microorganisms and preparation of inoculum

C. albicans culture was obtained from MTCC of Chandigarh, India and *F. udum* from Department of Botany, Gulbarga University, Kalaburgi. 48 hours old fungal cultures were grown in potato dextrose broth at 28°C and used for experimental studies.

(iv). Antifungal activity

The assay was conducted by agar well diffusion method. About 15 to 20 ml of potato dextrose agar medium was poured in the sterilized petridishes and allowed to solidify. Fungal lawn was prepared using 5 days old culture strain. The fungal strains were suspended in a saline solution (0.85% NaCl) and adjusted to a turbidity of 0.5 Mac Farland standards (108 CFU/ml). 1 ml of fungal strain was spread over

the medium using a sterilized glass spreader. Using flamed sterile borer, wells of 4mm diameter were punctured in the culture medium. Required fractions of extracts were added to the wells. The plates thus prepared were left for diffusion of extracts into media for one hour in the refrigerator and then incubated at 37°C. After incubation for 48 h, the plates were observed for zones of inhibition. The diameter of zone of inhibition was measured and expressed in millimeters. Dimethyl Sulphoxide (DMSO) was used as a negative control. Fluconazole was used as positive control (500µg/ml). The experiments were conducted in triplicates.

RESULTS AND DISCUSSIONS

(i). Preliminary screening of ethno medicinal plants for antifungal activity

57 ethno medicinal plants extracts were subjected to antimicrobial screening against two fungi namely *C. albicans* and *F. udum* using agar well diffusion method at concentrations of 5 & 2.5 mg/ml. The results are given in Table 1.

(ii). Screening against *Candida albicans* and *Fusarium udum*

The plant extracts and their level of activity against *C. albicans* and *F. udum* is enumerated in Table 1. A total of 285 solvent extracts from 57 ethnomedicinal plants belonging to 35 different families used in treating Candidiasis at Hyderabad Karnataka region were subjected to antifungal activity against *C. albicans* and *F. udum*. Among the extracts, 59 and 44 extracts exhibited very effective activity against *C. albicans* and *F. udum*. 44 and 37 extracts exhibited effective activity. 76 and 60 extracts exhibited moderate activity and 84 and 88 extracts exhibited weak activity against *C. albicans* and *F. udum*. No activity was seen in 22 and 56 extracts against *C. albicans* and *F. udum*, respectively (Table 2). Maximum activity was observed in all the solvents extracts of five medicinal plants namely, *A. mexicana*, *A. sativum*, *L. camara*, *T. purpurea* and *W. somnifera*. No inhibition was recorded in the negative control (DMSO), while the standard

drug, Fluconazole, significantly inhibited (17.00±0.0 to 23.66±0.57mm) the growth of the test organism. On the basis of the results obtained, it is concluded that 59 and 44 extracts were very effective crude extracts showed significant antifungal activity in *C. albicans* and *F. udum* (Table 1). In the present study, Petroleum ether, ethyl acetate and methanol extracts of *A. sativum* showed very effective activity against both the tested strains. However, Seema Bhadauria and Padma Kumar (2011)¹⁸ reported effective activity in aqueous extract. A study by Rehman and Samya Mairaj (2015)¹⁹ reported that the pharmaceutical importance of *A. sativum* is due to the presence of carbohydrate, protein, vitamins, essential metal and organosulphur compounds. Allicin is one of the active ingredients of freshly crushed garlic homogenates and showed a wide spectrum activity. Martin et al., (2003)²⁰ evaluated the in vitro antimicrobial activity of lozenges containing extract of garlic (*A. sativum*) and ginger (*Z. officinale*) and reported that there was inhibition of growth by nystatin tablet, but garlic and ginger combination only inhibited growth of laboratory strains of *C. albicans* and the garlic and ginger can be formulated into lozenges and used in non-resistant oral thrush (oral candidiasis). It was reported that it is worthy to note that in most cases of infection, a combination of antimicrobial activity and one or more other biological effects, such as immunomodulation, could be responsible for overall effect of a natural product²¹. It is therefore likely that a combination of these biological effects of garlic and ginger and the demonstrated antimicrobial effect may explain its usefulness in the management of oropharyngeal infections, especially those of fungal origin in folklore medicine. Apurva Pathak (2012)²² studied the anti-*Candida* activity of aqueous extracts of some herbals and reported that the *A. indica* and *M. koenigii* showed weak and the extract of *A. sativum* bulbs displayed a strong anti-Candidal activity against all the species of *Candida* tested. No significant difference between the mean values of zone size of Amphotericin B and herbal extracts reported. The extract of *A. sativum* bulbs (5mg/ml) was reported effective in controlling Candidal growth

under in vitro condition. Some *in-vitro* studies confirmed anti-bacterial^{23, 24} and anti-Candidal effects of garlic extracts^{25, 26}, but there is paucity of information regarding the *in-vivo* anti-candidiasis efficacy of garlic extracts. A study by Ankari et al., (1999)²⁷ reports that the garlic is known for anti-bacterial, antifungal (particularly against *C. albicans*), anti-parasitic and anti-viral activity. A study on in vitro antimicrobial properties of aqueous garlic extract against multidrug-resistant (MDR) bacteria and *Candida* species from Nigeria reported that the anticandidal effect of aqueous garlic extract (AGE) showed 27.4 ± 3.7 mm inhibition with no significant difference ($P > .05$) in MIC values at 24 and 48 h²⁸. The antifungal activity of 6 fractions derived from garlic was investigated in an in vitro system against the *Candida* spp. Ajoene had the strongest activity in this fractions^{7, 29, 30, 31}. In the present study, all the five solvent extracts of *A. mexicana* root showed very effective activity against both the tested fungal strains especially in ethyl acetate extracts. The inhibition zones against fungal strains were comparable to those elicited by Fluconazole. However, a study by Yashwant Bais et al., (2013)³² reports that the methanolic leaf extracts of *A. mexicana* did not show inhibitory action against bacteria, but was found to be very good against *C. albicans* as compared to other yeast strain. Another study by Indranil et al., (2006)³³ reported that the essential oil (aerial parts) of *A. mexicana* was found inhibitory for *C. albicans* than the essential oil isolated from root parts. The present study reports the effective antifungal activity of ethyl acetate extract of *L. camara* leaf at 5mg/ml concentration. However, Parivuguna et al., (2013)³⁴ carried out the anticandidal activity of the petroleum ether, benzene, chloroform, methanol and water extracts of *F. virginiana* and *L. camara* and reported that the petroleum ether extract of *F. virginiana* showed a maximum zone of inhibition whereas, the crude extracts of *L. camara* did not exhibit any anticandidal activity. The leaf extracts of *T. purpurea* in all the solvent extracts especially,

ethyl acetate extracts showed significant antifungal activity against both the test organisms. Whereas, a study by Thetwa et al., (2006)³⁵ tested the seed extracts of *T. purpurea* for their antimicrobial properties against some human, animal and plant pathogenic organisms and reported that the seed extract showed good results. In another study, Kumar et al., (2007)³⁶ evaluated antimicrobial activity of ethanolic extract of *T. purpurea* roots by disc diffusion and broth dilution methods and reported the significant activity. However, Sachin Parashram Venkatraman (2011)³⁷ reported potent activity in pet ether seed extracts of *T. purpurea*. The potent antifungal activity of root extracts of *W. somnifera* in ethyl acetate extract against both the test strains used in the study and the inhibitory effect was comparable with that of Fluconazole. However, Ethanol, acetone, Iso propyl alcohol, toluene and hexane extract of different aerial parts (leaf and flower) of *W. somnifera* was evaluated by Premlata Singariya et al.,(2012)³⁸ and reported that the extract of *W. somnifera* significantly inhibited 6 important bacteria and two fungi (*C. albicans* and *A. flavus*) to varying degrees. The inhibitory effect was very identical in magnitude and comparable with that of standard antibiotics Gentamycin. Pranay Jain and Rishabh Varshney (2011)³⁹ reported the antimicrobial activity of aqueous and methanolic extracts of *W. somnifera* (Ashwagandha) with highest in aqueous extract against *E. coli*, *P. aeruginosa*, *S. aureus*, *S. mutans* and *C. albicans*. In another report, ethanol extract was found effective against fungal strains namely, *A. niger*, *A. flavus*, *C. albicans*, *C. tropicalis*, *C. neoformans* and *C. kefyr*⁴⁰. The anti-*Candida* activity was also reported in plants like, *P. niruri*⁴¹, *Curcuma* variety⁴² *M. indica* seed extract⁴³. The present study also revealed very effective antimicrobial activity in *M. indica* against *E. coli* and *B. subtilis* in petroleum ether and ethyl acetate extract and *C. albicans* and *F. udum* in ethyl acetate extract. Similarly, *C. longa* was found effective in petroleum ether and ethyl acetate extracts.

Table 1

Preliminary antifungal screening of ethno medicinal plants of Hyderabad Karnataka region.

Sl. No.	Plant name, Family & Part used	Test strains	Zone of inhibition in different solvents (mm)												Contr ol (DMS O)	F
			P		C		E		M		A					
			a	b	a	b	a	b	a	b	a	b				
01.	<i>Abelmoschus ficulneus</i> (L.). Malvaceae (Root).	A	06.0 0 ± 1.00	04.3 3 ± 1.52	09.9 0 ± 1.00	05.3 3 ± 1.52	12.3 3 ± 1.52	10.3 3 ± 1.52	06.3 3 ± 1.52	07.3 3 ± 1.15	05.3 3 ± 1.52	04.3 3 ± 1.52	NA	17.3 3 ± 1.52		
		B	05.3 3 ± 1.52	03.3 3 ± 1.15	06.3 3 ± 1.52	05.3 3 ± 1.52	10.3 3 ± 1.52	07.3 3 ± 1.15	05.3 3 ± 1.52	06.0 0 ± 1.00	05.3 3 ± 1.52	03.3 3 ± 1.15	NA	17.3 3 ± 1.52		
02.	<i>Acacia ferruginea</i> DC. Fabaceae (Leaf).	A	10.3 3 ± 1.52	09.3 3 ± 1.15	08.9 0 ± 1.00	07.0 0 ± 0.00	11.3 3 ± 1.15	10.3 3 ± 1.52	04.6 6 ± 0.57	04.3 3 ± 1.52	NA	NA	NA	18.0 0 ± 0.00		
		B	08.9 0 ± 1.00	06.0 0 ± 1.00	07.0 0 ± 0.00	05.3 3 ± 1.52	10.3 3 ± 1.52	09.3 3 ± 1.15	04.3 3 ± 1.52	04.3 3 ± 1.52	NA	NA	NA	18.0 0 ± 0.00		
03.	<i>Achyranthus aspera</i> L. Amaranthaceae (Root).	A	10.6 6 ± 1.57	10.3 3 ± 1.52	08.0 0 ± 0.00	07.3 3 ± 1.15	14.3 3 ± 1.52	13.6 6 ± 1.57	10.3 3 ± 1.52	09.9 0 ± 1.00	08.9 0 ± 1.00	04.3 3 ± 1.52	NA	17.3 3 ± 1.52		
		B	09.3 3 ± 0.57	10.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	13.6 6 ± 1.57	12.3 3 ± 1.15	10.0 0 ± 0.00	09.9 0 ± 1.00	08.0 0 ± 0.00	NA	NA	17.3 3 ± 1.52		
04.	<i>Aerva lanata</i> (L.) Juss. Amaranthaceae (Leaf).	A	07.6 6 ± 1.15	06.2 0 ± 1.00	11.0 0 ± 0.00	06.3 3 ± 1.52	07.0 0 ± 0.00	05.3 3 ± 1.52	05.3 3 ± 1.52	07.0 0 ± 0.00	04.5 0 ± 0.00	NA	NA	17.0 0 ± 0.00		
		B	07.3 3 ± 1.52	06.3 3 ± 1.15	07.3 3 ± 1.52	07.6 6 ± 0.57	11.6 6 ± 1.15	05.0 0 ± 1.00	05.3 3 ± 1.52	04.6 6 ± 0.57	NA	NA	NA	17.3 3 ± 1.52		
05.	<i>Alangium salvifolium</i> (L.f.) Wang. Alangiaceae (Stem bark).	A	08.6 6 ± 1.15	07.3 3 ± 0.57	07.0 0 ± 0.00	06.6 6 ± 0.67	05.6 6 ± 1.52	05.3 3 ± 1.52	05.0 0 ± 0.00	04.3 3 ± 1.52	04.0 0 ± 0.00	NA	NA	17.6 6 ± 1.15		
		B	08.0 0 ± 0.00	08.9 0 ± 1.00	07.0 0 ± 0.00	06.3 3 ± 1.52	06.2 0 ± 1.00	06.0 0 ± 1.00	05.3 3 ± 1.52	05.0 0 ± 0.00	NA	NA	NA	23.6 6 ± 0.57		
06.	<i>Allium sativum</i> L. Liliaceae (Clove).	A	14.3 3 ± 1.52	12.3 3 ± 1.15	14.3 3 ± 1.52	13.6 6 ± 1.57	13.6 6 ± 1.57	12.3 3 ± 1.15	14.3 3 ± 1.52	13.6 6 ± 1.57	12.3 3 ± 1.15	11.0 0 ± 0.00	NA	20.6 6 ± 0.57		
		B	13.6 6 ± 1.57	11.0 0 ± 0.00	14.0 0 ± 0.00	12.3 3 ± 1.15	11.3 3 ± 1.15	11.0 0 ± 0.00	11.3 3 ± 1.15	11.0 0 ± 0.00	11.0 0 ± 0.00	11.0 0 ± 0.00	NA	17.6 6 ± 1.15		
07.	<i>Amaranthus spinosus</i> L. Amaranthaceae (Whole plant).	A	09.9 0 ± 1.00	09.3 3 ± 1.15	08.9 0 ± 1.00	08.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	06.2 0 ± 1.00	05.3 3 ± 1.52	04.5 0 ± 0.00	NA	NA	17.3 3 ± 1.52		
		B	09.3 3 ± 0.57	08.9 0 ± 1.00	08.9 0 ± 1.00	07.3 3 ± 0.57	07.6 3 ± 0.57	07.0 0 ± 0.00	06.3 3 ± 1.52	04.3 3 ± 1.52	04.5 0 ± 0.00	NA	NA	17.6 6 ± 0.57		
08.	<i>Argemone mexicana</i> L. Papaveraceae (Root).	A	13.6 6 ± 1.57	13.6 6 ± 1.57	16.6 6 ± 0.57	16.3 3 ± 1.52	19.6 6 ± 0.57	14.3 3 ± 1.52	12.3 3 ± 1.15	12.3 3 ± 1.15	11.3 3 ± 1.15	11.3 3 ± 1.15	NA	21.6 6 ± 1.15		
		B	12.3 3 ± 1.15	12.3 3 ± 1.15	14.3 3 ± 1.52	14.3 3 ± 1.52	18.6 6 ± 1.57	13.6 6 ± 1.57	11.3 3 ± 1.15	10.6 6 ± 0.57	11.0 0 ± 0.00	10.6 6 ± 0.57	NA	22.6 6 ± 1.15		
09.	<i>Aristolochia bracteolata</i> Lam.	A	10.3 3 ± 1.52	09.9 0 ± 1.00	09.3 3 ± 1.15	09.9 0 ± 1.00	08.6 6 ± 1.57	07.3 3 ± 1.15	07.3 3 ± 0.57	07.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.52	NA	18.0 0 ± 0.00		

	Aristolochiaceae (Stem).	B	09.3 3 ± 1.15	08.9 0 ± 1.00	08.0 0 ± 0.00	07.3 3 ± 0.57	10.3 3 ± 1.15	09.3 3 ± 1.15	08.9 0 ± 1.00	07.0 0 ± 0.00	06.3 3 ± 1.15	04.5 0 ± 0.00	NA	19.6 6 ± 0.57
10.	<i>Asparagus racemosus</i> Willd. Liliaceae (Whole plant).	A	11.3 3 ± 1.15	10.3 3 ± 1.15	10.6 6 ± 0.57	10.0 0 ± 0.00	12.3 3 ± 1.15	11.3 3 ± 1.15	09.3 3 ± 1.15	08.9 0 ± 1.00	07.6 6 ± 0.57	06.3 3 ± 1.15	NA	17.6 6 ± 1.15
		B	10.6 6 ± 0.57	10.0 0 ± 0.00	09.3 3 ± 1.15	09.3 3 ± 1.15	11.3 3 ± 1.15	10.3 3 ± 1.15	08.9 0 ± 1.00	07.3 3 ± 0.57	NA	NA	NA	19.0 0 ± 0.00
11.	<i>Azadirachta indica</i> A. Juss. Meliaceae (Root, Stem bark).	A	10.0 0 ± 0.00	09.3 3 ± 1.15	11.3 3 ± 1.15	10.6 6 ± 0.57	12.3 3 ± 1.15	11.3 3 ± 1.15	09.3 3 ± 1.15	08.6 6 ± 1.57	07.3 3 ± 1.15	06.3 3 ± 1.15	NA	17.6 6 ± 1.15
		B	09.9 0 ± 1.00	09.3 3 ± 1.15	08.9 0 ± 1.00	08.0 0 ± 0.00	12.3 3 ± 1.15	10.6 6 ± 0.57	07.0 0 ± 0.00	06.3 3 ± 1.15	09.3 3 ± 1.15	08.3 3 ± 1.52	NA	18.3 3 ± 1.52
12.	<i>Barleria prionitis</i> L. Acanthaceae (Leaf).	A	08.9 0 ± 1.00	08.0 0 ± 0.00	07.3 3 ± 0.57	06.2 0 ± 1.00	11.3 3 ± 1.15	09.3 3 ± 1.15	05.3 3 ± 1.52	05.3 3 ± 1.52	04.5 0 ± 0.00	NA	NA	18.6 6 ± 1.15
		B	08.0 0 ± 0.00	07.3 3 ± 1.15	08.9 0 ± 1.00	07.0 0 ± 0.00	10.6 6 ± 0.57	10.0 0 ± 0.00	08.0 0 ± 0.00	07.3 3 ± 1.15	NA	NA	NA	19.6 6 ± 1.15
13.	<i>Boerhavia diffusa</i> L. Nyctaginaceae (Whole plant).	A	08.0 0 ± 0.00	07.3 3 ± 1.15	09.9 0 ± 1.00	08.9 0 ± 1.00	12.3 3 ± 1.15	11.3 3 ± 1.15	10.3 3 ± 1.15	10.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.52	NA	18.3 3 ± 1.52
		B	09.9 0 ± 1.00	08.9 0 ± 1.00	08.9 0 ± 1.00	08.0 0 ± 0.00	10.6 6 ± 0.57	10.6 6 ± 0.57	10.0 0 ± 0.00	10.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.52	NA	18.3 3 ± 1.52
14.	<i>Bryophyllum pinnatum</i> (Lamk.) Kurz. Crassulaceae (Leaf).	A	07.0 0 ± 0.00	06.3 3 ± 1.15	08.9 0 ± 1.00	08.0 0 ± 0.00	09.9 0 ± 1.00	09.3 3 ± 1.15	08.6 6 ± 1.57	07.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.52	NA	17.3 3 ± 1.52
		B	09.9 0 ± 1.00	08.9 0 ± 1.00	10.0 0 ± 0.00	09.3 3 ± 1.15	11.3 3 ± 1.15	10.6 6 ± 0.57	06.2 0 ± 1.00	05.3 3 ± 1.52	NA	NA	NA	20.6 6 ± 0.57
15.	<i>Butea monosperma</i> (Lam.) Taub. Fabaceae (Stem bark, Seed, Flower).	A	08.9 0 ± 1.00	07.0 0 ± 0.00	NA	NA	09.9 0 ± 1.00	09.3 3 ± 1.15	NA	NA	NA	NA	NA	17.6 6 ± 1.15
		B	07.0 0 ± 0.00	06.3 3 ± 1.15	NA	NA	05.3 3 ± 1.52	04.5 0 ± 0.00	04.5 0 ± 0.00	NA	NA	NA	NA	18.5 0 ± 0.00
16.	<i>Calotropis gigantea</i> (L.) R.Br. Asclepiadaceae (Root, Latex).	A	08.9 0 ± 1.00	08.0 0 ± 0.00	07.3 3 ± 1.15	07.0 0 ± 0.00	12.3 3 ± 1.15	11.3 3 ± 1.15	07.0 0 ± 0.00	05.3 3 ± 1.52	04.3 3 ± 1.52	04.3 3 ± 1.52	NA	17.6 6 ± 1.15
		B	07.3 3 ± 1.15	06.3 3 ± 1.15	08.6 6 ± 1.15	08.0 0 ± 0.00	09.9 0 ± 1.00	09.6 6 ± 0.57	07.6 6 ± 0.57	06.3 3 ± 1.15	05.3 3 ± 1.52	05.3 3 ± 1.52	NA	17.6 6 ± 1.15
17.	<i>Capparis zeylanica</i> L. Capparaceae (Root).	A	06.3 3 ± 1.15	05.3 3 ± 1.52	07.0 0 ± 0.00	07.0 0 ± 0.00	09.3 3 ± 1.15	08.9 0 ± 1.00	08.6 6 ± 1.57	08.0 0 ± 0.00	05.3 3 ± 1.52	04.5 0 ± 0.00	NA	18.6 6 ± 0.57
		B	NA	NA	07.0 0 ± 0.00	06.3 3 ± 1.15	08.6 6 ± 1.15	08.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.52	NA	NA	NA	18.6 6 ± 0.57
18.	<i>Cassia auriculata</i> L. Fabaceae (Leaf).	A	07.6 6 ± 0.57	07.0 0 ± 0.00	06.3 3 ± 1.15	05.0 0 ± 0.00	11.3 3 ± 1.15	10.6 6 ± 0.57	08.9 0 ± 1.00	07.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.52	NA	17.6 6 ± 1.15
		B	06.3 3 ± 1.15	05.3 3 ± 1.52	07.3 3 ± 1.15	06.3 3 ± 1.15	08.9 0 ± 1.00	07.0 0 ± 0.00	06.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.52	05.0 0 ± 0.00	NA	17.6 6 ± 1.15
19.	<i>Cassia fistula</i> L. Fabaceae (Leaf).	A	NA	NA	06.3 3 ± 1.15	06.3 3 ± 1.15	10.6 6 ± 0.57	10.0 0 ± 0.00	06.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.52	05.0 0 ± 0.00	NA	19.0 0 ± 1.00

	B	NA	NA	05.3 3 ± 1.52	05.0 0 ± 0.00	09.9 0 ± 1.00	09.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	05.0 0 ± 0.00	04.5 0 ± 0.00	NA	19.0 0 ± 1.00	
20.	<i>Cassytha filiformis</i> L. Lauraceae (Stem).	A	07.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.52	05.0 0 ± 0.00	11.3 3 ± 1.15	10.3 3 ± 1.15	06.3 3 ± 1.15	06.0 0 ± 0.00	04.6 6 ± 1.15	04.0 0 ± 0.00	NA	17.6 6 ± 1.15
	B	NA	NA	NA	NA	09.9 0 ± 1.00	09.0 0 ± 0.00	06.3 3 ± 1.15	05.0 0 ± 0.00	NA	NA	NA	18.3 3 ± 1.52	
21.	<i>Crotalaria prostrata</i> Rottl. Fabaceae (Whole plant).	A	08.9 0 ± 1.00	08.0 0 ± 0.00	09.9 0 ± 1.00	08.0 0 ± 0.00	10.3 3 ± 1.15	09.9 0 ± 1.00	07.3 3 ± 1.15	07.0 0 ± 0.00	06.3 3 ± 1.15	06.0 0 ± 0.00	NA	17.6 6 ± 1.15
	B	06.3 3 ± 1.15	06.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	09.0 0 ± 0.00	08.9 0 ± 0.00	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	NA	NA	19.0 0 ± 1.00	
22.	<i>Cissus quadrangulais</i> L. Vitaceae (Stem).	A	05.3 3 ± 1.52	05.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	07.3 3 ± 1.15	07.0 0 ± 0.00	NA	NA	NA	NA	18.0 0 ± 0.00	
	B	NA	NA	06.3 3 ± 1.15	05.3 3 ± 1.52	08.9 0 ± 1.00	08.0 0 ± 0.00	07.0 0 ± 0.00	05.3 3 ± 1.52	NA	NA	NA	18.3 3 ± 1.52	
23.	<i>Citrus medica</i> L. Rutaceae (Fruit).	A	04.6 6 ± 1.15	04.0 0 ± 0.00	05.3 3 ± 1.52	05.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.52	04.6 6 ± 1.15	04.0 0 ± 0.00	NA	17.6 6 ± 1.15
	B	NA	NA	06.0 0 ± 0.00	05.3 3 ± 1.52	06.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.52	05.0 0 ± 0.00	NA	NA	NA	19.0 0 ± 1.00	
24.	<i>Coccinea grandis</i> L. Cucurbitaceae (Leaf).	A	06.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.52	04.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.52	05.3 3 ± 1.52	04.6 6 ± 1.15	04.6 6 ± 1.15	04.3 3 ± 1.52	NA	18.0 0 ± 0.00
	B	06.0 0 ± 0.00	05.3 3 ± 1.52	04.6 6 ± 1.15	04.0 0 ± 0.00	05.3 3 ± 1.52	05.0 0 ± 0.00	04.6 6 ± 1.15	04.3 3 ± 1.52	04.3 3 ± 1.52	NA	NA	17.6 6 ± 0.57	
25.	<i>Coriandrum sativum</i> L. Apiaceae (Leaf).	A	07.0 0 ± 0.00	06.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.52	07.3 3 ± 1.15	07.0 0 ± 0.00	06.0 0 ± 0.00	05.3 3 ± 1.52	04.6 6 ± 1.15	04.0 0 ± 0.00	NA	19.0 0 ± 0.00
	B	06.3 3 ± 1.15	05.3 3 ± 1.52	04.6 6 ± 1.15	04.3 3 ± 1.52	07.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.52	05.0 0 ± 0.00	04.0 0 ± 0.00	NA	NA	20.6 6 ± 0.57	
26.	<i>Cucumis callosus</i> L. Cucurbitaceae (Seed).	A	NA	NA	NA	NA	10.3 3 ± 1.15	10.0 0 ± 0.00	09.6 6 ± 1.15	08.6 6 ± 1.15	05.3 3 ± 1.52	04.6 6 ± 1.15	NA	18.6 6 ± 0.57
	B	NA	NA	NA	NA	10.0 0 ± 0.00	09.6 6 ± 1.15	NA	NA	NA	NA	NA	19.6 6 ± 1.15	
27.	<i>Curcuma longa</i> L. Zingiberaceae (Rhizome).	A	07.0 0 ± 0.00	06.3 3 ± 1.15	07.3 3 ± 1.15	07.0 0 ± 0.00	09.0 0 ± 0.00	08.9 0 ± 1.00	06.3 3 ± 1.15	05.3 3 ± 1.52	04.6 6 ± 1.15	04.0 0 ± 0.00	NA	18.3 3 ± 1.52
	B	06.3 3 ± 1.15	05.3 3 ± 1.52	05.3 3 ± 1.52	05.0 0 ± 0.00	08.0 0 ± 0.00	07.3 3 ± 1.15	06.0 0 ± 0.00	05.0 0 ± 0.00	04.0 0 ± 0.00	NA	NA	17.6 6 ± 0.57	
28.	<i>Delonix elata</i> (L.) Gamb. Fabaceae (Leaf).	A	NA	NA	04.6 6 ± 1.15	04.0 0 ± 0.00	10.0 0 ± 0.00	08.9 0 ± 1.00	08.0 0 ± 0.00	07.3 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.52	NA	19.0 0 ± 1.00
	B	NA	NA	04.0 0 ± 0.00	04.0 0 ± 0.00	08.9 0 ± 1.00	08.0 0 ± 0.00	07.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.52	04.6 6 ± 1.15	NA	19.3 3 ± 1.5	
29.	<i>Dichanthium annulatum</i> (L.). Poaceae	A	05.3 3 ± 1.52	05.0 0 ± 0.00	05.0 0 ± 0.00	04.6 6 ± 1.15	08.9 0 ± 1.00	06.3 3 ± 1.15	07.3 3 ± 1.15	06.3 3 ± 1.15	05.6 6 ± 1.15	NA	NA	18.6 6 ± 0.57

(Root).	B	NA	NA	04.6 6 ± 1.15	04.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	06.3 3 ± 1.15	05.6 6 ± 1.15	NA	NA	NA	20.6 6 ± 0.57
30. <i>Dichrostachys cinerea</i> (L.) Wight & Arn. Fabaceae (Leaf).	A	06.0 0 ± 0.00	05.3 3 ± 1.52	04.0 0 ± 0.00	04.0 0 ± 0.00	05.6 6 ± 1.15	05.0 0 ± 0.00	06.3 3 ± 1.15	05.6 6 ± 1.15	05.3 3 ± 1.52	05.0 0 ± 0.00	NA	18.3 3 ± 1.52
	B	NA	NA	NA	NA	05.0 0 ± 0.00	04.6 6 ± 1.15	04.6 6 ± 1.15	04.0 0 ± 0.00	05.0 0 ± 0.00	NA	NA	18.3 3 ± 1.52
31. <i>Ficus religiosa</i> L. Moraceae (Stem bark, Leaf).	A	06.3 3 ± 1.15	05.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	10.0 0 ± 0.00	08.9 0 ± 1.00	06.3 3 ± 1.15	05.6 6 ± 1.15	05.3 3 ± 1.52	04.6 6 ± 1.15	NA	19.0 0 ± 0.00
	B	05.6 6 ± 1.15	05.3 3 ± 1.52	05.0 0 ± 0.00	04.6 6 ± 1.15	08.9 0 ± 1.00	07.3 3 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	04.6 6 ± 1.15	NA	NA	18.6 6 ± 0.57
32. <i>Goniogyna hirta</i> L. Fabaceae (Whole plant).	A	05.3 3 ± 1.52	04.6 6 ± 1.15	04.0 0 ± 0.00	04.0 0 ± 0.00	09.6 6 ± 0.57	08.9 0 ± 1.00	06.3 3 ± 1.15	05.6 6 ± 1.15	04.6 6 ± 1.15	NA	NA	19.0 0 ± 1.00
	B	04.6 6 ± 1.15	04.0 0 ± 0.00	NA	NA	08.9 0 ± 1.00	07.3 3 ± 1.15	05.6 6 ± 1.15	04.6 6 ± 1.15	NA	NA	NA	20.6 6 ± 0.57
33. <i>Gymnema sylvestre</i> Retz. Schulte. Asclepiadaceae (Leaf).	A	07.3 3 ± 1.15	07.0 0 ± 0.00	06.3 3 ± 1.15	05.6 6 ± 1.15	10.6 6 ± 1.15	10.0 0 ± 0.00	06.3 3 ± 1.15	05.6 6 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	18.3 3 ± 1.52
	B	07.0 0 ± 0.00	06.3 3 ± 1.15	05.6 6 ± 1.15	05.3 3 ± 1.52	10.0 0 ± 0.00	09.6 6 ± 0.57	05.6 6 ± 1.15	05.3 6 ± 1.15	05.0 3 ± 0.00	04.6 6 ± 1.15	NA	17.6 6 ± 0.57
34. <i>Hibiscus rosa-sinensis</i> L. Malvaceae (Flower).	A	04.6 6 ± 1.15	04.0 0 ± 0.00	05.6 6 ± 1.15	05.0 0 ± 0.00	11.6 6 ± 0.57	10.6 6 ± 1.15	09.0 0 ± 0.00	08.9 0 ± 1.00	07.3 3 ± 1.15	06.3 3 ± 1.15	NA	19.0 0 ± 0.00
	B	NA	NA	05.0 0 ± 0.00	04.6 6 ± 1.15	10.6 6 ± 1.15	09.0 0 ± 0.00	08.9 0 ± 1.00	07.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	NA	18.6 6 ± 0.57
35. <i>Hybanthus enneaspermus</i> (L.) F.V. Muell. Violaceae (Seed).	A	06.3 3 ± 1.15	05.3 3 ± 1.52	05.3 3 ± 1.52	05.0 0 ± 0.00	08.0 0 ± 0.00	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	NA	NA	NA	18.0 0 ± 0.00
	B	NA	NA	05.0 0 ± 0.00	04.6 6 ± 1.15	07.6 6 ± 1.15	06.6 6 ± 1.15	05.0 0 ± 0.00	05.0 0 ± 0.00	NA	NA	NA	20.6 6 ± 0.57
36. <i>Ipomea batatas</i> (L.) Lamk. Convolvulaceae (Root).	A	NA	NA	05.3 3 ± 1.52	04.6 6 ± 1.15	06.6 6 ± 1.15	05.3 3 ± 1.52	05.3 3 ± 1.15	05.0 0 ± 0.00	04.6 6 ± 1.15	NA	NA	20.0 0 ± 0.00
	B	NA	NA	05.0 0 ± 0.00	04.0 0 ± 0.00	05.3 3 ± 1.52	04.6 6 ± 1.15	05.0 0 ± 0.00	04.6 6 ± 1.15	04.6 6 ± 1.15	NA	NA	21.6 6 ± 1.15
37. <i>Jatropha glandulifera</i> Roxb. Euphorbiaceae (Rhizome).	A	07.6 6 ± 1.15	06.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	08.6 6 ± 1.15	07.6 6 ± 1.15	06.6 6 ± 1.15	06.0 0 ± 0.00	05.6 6 ± 1.15	NA	NA	18.0 0 ± 0.00
	B	NA	NA	06.0 0 ± 0.00	05.6 6 ± 1.15	07.6 6 ± 1.15	06.6 6 ± 1.15	06.0 0 ± 0.00	05.6 6 ± 1.15	NA	NA	NA	21.6 6 ± 1.15
38. <i>Lagascea mollis</i> Cam. Asteraceae (Leaf).	A	NA	NA	05.6 6 ± 1.15	05.0 0 ± 0.00	07.6 6 ± 1.15	06.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	NA	NA	NA	17.6 6 ± 0.57
	B	NA	NA	05.0 0 ± 0.00	04.6 6 ± 1.15	06.0 0 ± 0.00	05.6 6 ± 1.15	05.0 0 ± 0.00	04.6 6 ± 1.15	NA	NA	NA	18.0 0 ± 0.00
39. <i>Lantana camara</i> L. Verbenaceae	A	13.6 6 ± 0.57	12.6 6 ± 0.57	15.6 6 ± 0.57	13.6 6 ± 0.57	18.6 6 ± 0.57	13.0 0 ± 0.00	12.0 0 ± 0.00	11.6 6 ± 0.57	11.6 6 ± 0.57	10.6 6 ± 1.15	NA	22.6 6 ± 1.15

	(Leaf).	B	13.6 6 ± 0.57	11.6 6 ± 0.57	15.6 6 ± 0.57	15.6 6 ± 0.57	17.0 0 ± 0.00	12.0 0 ± 0.00	11.0 0 ± 0.00	11.0 0 ± 0.00	11.0 0 ± 0.00	10.6 6 ± 1.15	NA	22.0 0 ± 0.00
40.	<i>Lawsonia inermis</i> L. Lythraceae (Leaf).	A	08.6 6 ± 1.15	07.6 6 ± 1.15	06.6 6 ± 1.15	05.6 6 ± 1.15	08.0 0 ± 0.00	07.6 6 ± 1.15	06.6 6 ± 1.15	05.6 6 ± 1.15	04.6 6 ± 1.15	05.0 0 ± 0.00	NA	18.0 0 ± 0.00
		B	07.6 6 ± 1.15	06.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	07.6 6 ± 1.15	07.0 0 ± 0.00	05.6 6 ± 1.15	05.0 0 ± 0.00	05.0 0 ± 0.00	NA	NA	20.0 0 ± 0.00
41.	<i>Malvastrum coromandelianum</i> (L.) Garck. Malvaceae (Leaf).	A	07.0 0 ± 0.00	06.6 6 ± 1.15	06.6 6 ± 1.15	05.6 6 ± 1.15	07.6 6 ± 1.15	07.0 0 ± 0.00	05.0 0 ± 0.00	04.6 6 ± 1.15	NA	NA	NA	22.6 6 ± 1.15
		B	NA	NA	05.6 6 ± 1.15	05.0 0 ± 0.00	08.6 6 ± 1.15	07.6 6 ± 1.15	04.6 6 ± 1.15	04.0 0 ± 0.00	NA	NA	NA	23.6 6 ± 0.57
42.	<i>Mangifera indica</i> L. Anacardiaceae (Leaf).	A	07.6 6 ± 1.15	06.6 6 ± 1.15	06.0 0 ± 0.00	05.6 6 ± 1.15	12.0 0 ± 0.00	11.6 6 ± 0.57	07.6 6 ± 1.15	06.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	NA	17.6 6 ± 1.15
		B	06.6 6 ± 1.15	05.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	11.6 6 ± 0.57	11.0 0 ± 0.00	06.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	NA	NA	18.6 6 ± 1.15
43.	<i>Maytenus senegalensis</i> (Lam.) Exzell. Celastraceae (Root).	A	06.6 6 ± 1.15	06.0 0 ± 0.00	06.0 0 ± 0.00	05.6 6 ± 1.15	10.6 6 ± 1.15	10.0 0 ± 0.00	05.6 6 ± 1.15	05.6 6 ± 1.15	05.0 0 ± 0.00	NA	NA	17.6 6 ± 0.57
		B	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	NA	06.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	NA	NA	17.6 6 ± 1.15
44.	<i>Musa paradisiaca</i> L. Musaceae (Stem, Fruit).	A	NA	NA	06.0 0 ± 0.00	05.3 3 ± 1.15	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	06.0 0 ± 0.00	05.3 3 ± 1.15	NA	18.0 0 ± 0.00
		B	NA	NA	05.3 3 ± 1.15	05.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.15	04.6 6 ± 1.15	NA	NA	18.6 6 ± 1.15
45.	<i>Nelumbo nucifera</i> Gaertn. Nelumbonaceae (Rhizome).	A	05.3 3 ± 1.15	05.0 0 ± 0.00	05.3 3 ± 1.15	05.0 0 ± 0.00	09.6 6 ± 1.15	08.6 6 ± 1.15	08.0 0 ± 0.00	07.6 6 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	17.6 6 ± 1.15
		B	NA	NA	05.0 0 ± 0.00	04.6 6 ± 1.15	07.6 6 ± 1.15	06.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	18.5 0 ± 0.00
46.	<i>Phyllanthus emblica</i> L. Euphorbiaceae (Fruit).	A	07.6 6 ± 1.15	06.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	07.6 6 ± 1.15	07.0 0 ± 0.00	05.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	17.6 6 ± 1.15
		B	06.3 3 ± 1.15	05.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	07.0 0 ± 0.00	06.3 3 ± 1.15	05.0 0 ± 0.00	04.6 6 ± 1.15	04.6 6 ± 1.15	NA	NA	17.6 6 ± 1.15
47.	<i>Phyllanthus niruri</i> L. Euphorbiaceae (Leaf).	A	06.0 0 ± 0.00	05.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	09.3 6 ± 1.15	08.3 6 ± 1.15	07.6 6 ± 1.15	06.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	NA	18.6 6 ± 1.15
		B	05.3 3 ± 1.15	05.0 0 ± 0.00	05.3 3 ± 1.15	05.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	05.3 3 ± 1.15	05.0 0 ± 0.00	05.3 3 ± 1.15	NA	NA	18.0 0 ± 0.00
48.	<i>Ricinus communis</i> L. Euphorbiaceae (Seed).	A	05.0 0 ± 0.00	04.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	08.6 6 ± 1.15	07.6 6 ± 1.15	07.0 0 ± 0.00	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	22.6 6 ± 1.15
		B	04.3 3 ± 1.15	04.0 0 ± 0.00	05.3 3 ± 1.15	04.3 3 ± 1.15	07.6 6 ± 1.15	06.3 3 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	NA	NA	NA	20.0 0 ± 0.00
49.	<i>Semecarpus anacardium</i> L.f. Anacardiaceae	A	NA	NA	NA	NA	08.6 6 ± 1.15	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	NA	NA	NA	18.6 6 ± 1.15

(Fruit).	B	NA	NA	NA	NA	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	NA	NA	NA	18.6 6 ± 1.15
50. <i>Sida cordifolia</i> L. Malvaceae (Leaf).	A	06.3 3 ± 1.15	06.0 0 ± 0.00	08.0 0 ± 0.00	07.6 6 ± 1.15	09.6 6 ± 1.15	08.6 6 ± 1.15	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	04.6 6 ± 1.15	NA	18.0 0 ± 0.00
	B	06.0 0 ± 0.00	05.3 3 ± 1.15	07.6 6 ± 1.15	07.0 0 ± 0.00	08.6 6 ± 1.15	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	04.6 6 ± 1.15	NA	17.6 6 ± 1.15
51. <i>Solanum nigrum</i> L. Solanaceae (Fruit).	A	07.6 6 ± 1.15	07.0 0 ± 0.00	07.0 0 ± 0.00	06.0 0 ± 0.00	08.0 0 ± 0.00	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	04.6 6 ± 1.15	NA	18.0 0 ± 0.00
	B	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	07.6 6 ± 1.15	06.3 3 ± 1.15	05.3 3 ± 1.15	05.0 0 ± 0.00	05.0 0 ± 0.00	NA	NA	18.6 6 ± 1.15
52. <i>Tephrosia purpurea</i> (Del.) Pers. Fabaceae (Leaf).	A	14.3 3 ± 1.52	13.6 6 ± 0.57	16.3 3 ± 1.52	15.6 6 ± 0.57	16.3 3 ± 1.52	14.6 6 ± 1.15	14.6 6 ± 1.15	13.6 6 ± 0.57	14.3 3 ± 1.52	10.6 6 ± 1.15	NA	23.6 6 ± 0.57
	B	14.0 0 ± 0.00	13.0 0 ± 0.00	15.6 6 ± 0.57	14.3 3 ± 1.52	14.3 3 ± 1.52	13.0 0 ± 0.00	14.6 6 ± 1.15	13.0 0 ± 0.00	12.0 0 ± 0.00	10.0 0 ± 0.00	NA	22.6 6 ± 1.15
53. <i>Terminalia chebula</i> Retz. Combretaceae (Fruit).	A	08.6 6 ± 1.15	08.0 0 ± 1.00	08.6 6 ± 1.15	07.6 6 ± 1.15	13.0 0 ± 0.00	12.3 3 ± 1.52	09.6 6 ± 1.15	9.00 ±	08.6 6 ± 1.15	08.0 0 ± 0.00	NA	18.6 6 ± 1.15
	B	08.0 0 ± 1.00	07.6 6 ± 1.15	08.6 6 ± 1.15	08.0 0 ± 1.00	12.3 3 ± 1.52	11.3 3 ± 1.52	09.6 6 ± 1.15	08.6 6 ± 1.15	06.3 3 ± 1.15	06.0 0 ± 0.00	NA	18.0 0 ± 0.00
54. <i>Tribulus terrestris</i> L. Zygophyllaceae (Fruit).	A	08.0 0 ± 0.00	07.6 6 ± 1.15	08.0 0 ± 1.00	07.6 6 ± 1.15	12.0 0 ± 0.00	11.3 3 ± 1.52	10.6 6 ± 1.15	10.0 0 ± 0.00	07.6 6 ± 1.15	06.3 3 ± 1.15	NA	18.0 0 ± 0.00
	B	07.6 6 ± 1.15	07.0 0 ± 0.00	07.6 6 ± 1.15	07.0 0 ± 0.00	11.3 3 ± 1.52	10.6 6 ± 1.15	10.0 0 ± 0.00	9.00 ±	07.0 0 ± 0.00	05.0 0 ± 0.00	NA	20.0 0 ± 0.00
55. <i>Tridax procumbens</i> L. Asteraceae (Whole plant).	A	NA	NA	06.3 3 ± 1.15	06.0 0 ± 0.00	10.6 6 ± 1.15	10.0 0 ± 0.00	06.3 3 ± 1.15	06.0 0 ± 0.00	05.3 3 ± 1.15	NA	NA	20.0 0 ± 0.00
	B	NA	NA	05.3 3 ± 1.15	05.0 0 ± 0.00	09.6 6 ± 1.15	9.00 ±	06.0 0 ± 0.00	05.6 6 ± 1.15	NA	NA	NA	17.6 6 ± 1.15
56. <i>Withania somnifera</i> L. Solanaceae (Root).	A	14.6 6 ± 1.15	14.3 3 ± 1.52	15.0 0 ± 0.00	14.0 0 ± 0.00	15.6 6 ± 0.57	14.6 6 ± 1.15	13.3 3 ± 1.52	12.3 3 ± 1.52	11.3 3 ± 1.52	10.6 6 ± 1.15	NA	19.0 0 ± 1.00
	B	13.0 0 ± 0.00	12.0 0 ± 0.00	13.6 6 ± 0.57	14.0 0 ± 0.00	13.6 6 ± 0.57	13.6 6 ± 0.57	11.3 3 ± 1.52	11.3 3 ± 1.52	10.6 6 ± 1.15	10.0 0 ± 0.00	NA	20.0 0 ± 0.00
57. <i>Woodfordia fruticosa</i> (L.) Kurz, J.Asiat. Lythraceae (Flower).	A	10.6 6 ± 1.15	9.00 ±	09.6 6 ± 1.15	08.0 0 ± 1.00	10.6 6 ± 1.15	10.0 0 ± 0.00	09.6 6 ± 1.15	08.6 6 ± 1.15	08.0 0 ± 1.00	NA	NA	21.6 6 ± 1.15
	B	10.0 0 ± 0.00	9.00 ±	09.0 0 ± 1.00	07.6 6 ± 1.15	10.3 3 ± 1.52	10.0 0 ± 0.00	08.6 6 ± 1.15	08.0 0 ± 1.00	08.0 0 ± 0.00	NA	NA	17.6 6 ± 1.15

P= Petroleum ether extract, C= Chloroform extract, E= Ethyl acetate extract, M= Methanol extract, A= Aqueous extract, C= Control (DMSO), F= Fluconazole, NA= No Activity, a= 5 mg⁻¹, b= 2.5 mg⁻¹. A= *Candida albicans*, B= *Fusarium udum*.

Table 2
Antifungal frequency of 57 ethnomedicinal plants

Sl. No.	Test strains	Very effective	Effective	Moderate	Weak	No activity
01	<i>Candida albicans</i>	59	44	76	84	22
02	<i>Fusarium udum</i>	44	37	60	88	56

CONCLUSION

Since plants produce a variety of compounds with antimicrobial properties, it is expected that screening programs for some under-represented target such as antifungal activity may yield candidate compounds for developing new antifungal drugs. Out of 57 plant species *A. mexicana*, *W. somnifera*, *T. purpurea* and *L. camara* and *A. sativum* showed significant antifungal activity against test microbes and will be useful in the discovery of new antifungal drug. The extracts that showed strong antifungal activity especially against *Candida*

needs further investigation in order to isolate and identify the active compounds.

ACKNOWLEDGEMENT

First author would like to thank Gulbarga University, Kalaburgi, for providing financial assistance through University Research Studentship to meritorious students pursuing Ph.D. course.

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