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Taxonomy, Ethnobotany and Antimicrobial Activity of *Croton bonplandianum*, *Euphorbia hirta* and *Phyllanthus fraternus*

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Abstract

Studies on taxonomy, ethnobotany and antimicrobial potential of *Croton bonplandianum*, *Euphorbia hirta* and *Phyllanthus fraternus* were carried out. Studied plants were described in details for various features and their identities were confirmed. Ethnobotanical uses were recorded by interacting with locals. Various extracts from these plants were evaluated against four bacterial and one fungal species. Three different solvents- water, methanol and petroleum ether were used for extraction purpose. Agar well diffusion method was used in these studies for evaluation of antimicrobial activity. Some important ethnobotanical uses were recorded for them. Among the three plants studied, methanolic extract of *Euphorbia hirta* was found to possess a broad spectrum of antimicrobial activity against studied bacterial strains. For the antifungal activity, none of the plants could provide promising results.

Key words: *Croton bonplandianum*, *Euphorbia hirta*, *Phyllanthus fraternus*, ethnobotany, antimicrobial activity

Introduction

An urgent need is presently felt in the pharma sector to search for new antimicrobial compounds due to increased cases of development of resistance by microorganisms to the currently used antibiotics¹⁻³. All this has necessitated a search for new antimicrobial substances from different sources including plants. Ethnobotanical investigations have proved a good source of information for searching new phytochemicals to be used as potential drugs. Over 7500 plant species

have been reported to be used in the Indian traditional medicinal system including ethnomedicines⁴. Traditionally used medicinal plants produce a variety of compounds of known therapeutic properties⁵. Many plants have been screened for their antimicrobial activities and drugs have been formulated worldwide⁶ and in India⁷⁻⁹. Many studies focus on determining the antimicrobial activity of plant extracts found in folk medicine, essential oils or isolated compounds such as alkaloids, fluorides, sesquiterpene, lactones, triterpenes and naphthoquinones¹⁰⁻¹⁶.

As knowledge of traditional medicinal system largely depends upon the information

provided by tribal and other local communities living in remote areas, particularly in forests, they do not have the knowledge of technical language of botanical description of the plants. Hence, it is needed to have taxonomic details of the plants under investigations to confirm its correct botanical name. So, now a days the taxonomical investigations are also being carried out along with ethnobotanical and other phytochemicals investigations. This has helped the researchers to establish the identity of the plants world-wide without any misidentification.

Euphorbiaceae family in the plant kingdom is a complex hetero-geneous family consisting of about 322 genera and 8900 species in the world. In India, this family is represented by 73 genera and 410 species. Here three plants of euphorbiaceae family viz. *Euphorbia hirta*, *Croton bonplandianum* and *Phyllanthus fraternus* were selected to investigate their antimicrobial potential.

Euphorbia hirta L. commonly known as asthma weed (English), Dugdhika, Kshirini, Ksheeravi, Svaduparni (Sanskrit), Dudeli (Gujarati), Dudhi (Hindi), Chittirappala, Nelapalai (Malayalam), Barokheruie (Bengali) Dudhi, Mothidudhi (Marathi), Reddinanabrolu (Telgu), Amampatchaiarisi (Tamil), Ambin jantin (Malasiya), Daun biji kcang (Indonesia), Botobotonis (Philippines) and Nam nomraatchasee (Thailand). This is an annual herb can be found flowering and fruiting almost throughout the year. This plant has traditionally been used in Asia to treat bronchitic asthma and laryngeal spasm¹⁷. This plant is also used in the treatment of athlete's foot, conjunctivitis, dysentery, enteritis, worm infestation and skin conditions. The latex of the plant is used for warts and cuts. This plant is antipruritic, aphrodisiac, carminative, depurative, diuretic, febrifuge, galactagogue, purgative and vermifuge in nature. Its leaves are eaten as vegetable during feminine. Many phytochemicals have been found in this plant belonging to different groups like sterols, alkaloids, tannins, glycosides, triterpenoids and alkenes. Phytochemicals characterized from this plant includes camphol, leucocyanidol, quercitol, quercitin, rhamnase, eophorbon, chlorophenolic acid, taraxerol, taraxerone and gallic acid¹⁸⁻¹⁹. The antimicrobial activity against some microbes has also been reported for this plant²⁰.

Croton bonplandianum, commonly known as three-leaved caper (English), Ban Tulsi, Jungle

Tulsi (Bengali), Kala Bhangra (Hindi), Eliamanakku (Tamil), Kukka mirapa (Telgu), Alpa bedhi soppu (Kannada). This plant is a perennial herb and can be found in waste lands and roadside areas. Flowering and fruiting time of this plant is September to December. The part which has medicinal value is seed and seed oil. The seeds are used for the treatment of jaundice, acute constipation, abdominal dropsy and internal abscesses²¹. The seed of *Croton bonplandianum* contain diterpenes, phorbol ester, including 12-Ortho-trideconeoly-phorbol-13-acetate (TPA) and myristoylphorbol- acetate (MPA). TPA is a carcinogen, affecting prostglandin metabolism. Various extracts of this plant are also known to possess antimicrobial activity and antitumour activity²²⁻²³. This plant is also considered as chologogue and purgative. The fresh juice of the plant is used against headache by ethnic groups²⁴.

Phyllanthus fraternus is an annual herb, tribally known as Mui-ara or Bhui-amlā. Other names of this herb are bhumyaamalaki (Sanskrit), Keelanelli (Tamil), Kirunelli, (Kannada), Nela usiri (Telgu), Bhonya anmali (Gujarati), Badianla (Oriya) and Vali (Marathi). It's flowering and fruiting time is from April to August. It is found distributed in tropical and subtropical regions of the world and it is native of India and West Pakistan. It is a common weed and found in the plains from Punjab to Assam and Southward of Kerala²⁵. Its main uses are for treatment of many types of biliary and urinary conditions including gall bladder and kidney stones, hepatitis, colds, flu, tuberculosis, viral infections, liver diseases, anemia, and for bacterial infections such as cystitis, prostatitis, venereal diseases and urinary tract infections²⁶. The plant is employed for numerous other conditions such as colic, diabetes, malaria, dysentery, fever, pain, tumours, vaginitis, gonorrhoea and dyspepsia. The plant also expels worms, intestinal gas and acts as a mild laxative²⁷⁻²⁸. This plant mainly contains phyllanthin, phyllantidine, hypophyllanthin, niranthin, nirtetralin, phylteralin²⁹. A few reports are available showing its antimicrobial properties against various microorganisms³⁰.

All the three plants selected for the present study have not been evaluated so much for their antimicrobial potential. The present study reports the antimicrobial activity of aqueous, methanol and petroleum ether extract of *Euphorbia hirta*, *Croton*

bonplandianum and *Phyllanthus fraternus* against four bacterial and one fungal species.

Experimental

Plant Material

Disease free fresh plant materials (whole aerial portion) were collected from various localities of Panipat district (Haryana) randomly in the month of April, 2007. One specimen for each plant material was used for preparation of Herbarium. For other studies, collected plant materials were thoroughly cleaned and subjected to complete dryness in an oven maintained at temperature of about 40°C and then homogenized to fine powder.

Description of the Plants

Plants were thoroughly studied and their various features were described according to standard taxonomic procedures in technical language to correctly identify the plants. Different floras were consulted for the purpose of identification³¹⁻⁴⁰.

Ethnobotanical Investigations

Various uses of the plant were recorded by interacting with the local villagers of the Panipat district of Haryana. Migrated people from other states and working here in various industries were also included in the study.

Preparation of Crude Extracts

Three different solvents namely water, methanol and petroleum ether were used for extraction from the fine powder using standard method⁴¹ with minor modifications. For making aqueous extract, 10 g of the fine powder was taken in a 250 ml flask. To this, 100 ml of distilled water was added and kept on shaker for 24 hours. After shaking, it was filtered through four folds of muslin cloth. Residue was again extracted in similar way and both the extracts were pooled together and filtered with Whatman filter paper No.1. Methanolic extract was prepared in similar way as in case of water extract. 10 g of fine powder was extracted with 100 ml of methanol with shaking. After filtering with muslin cloth, residue was again extracted and extracts were pooled together. This extract was filtered through Whatman filter paper No.1. Similarly 10 g of fine powder of each plant was extracted twice with 100 ml of petroleum ether

and filtered through muslin cloth and Whatman filter paper No. 1.

All the extracts obtained as above were kept in oven at 45°C upto dryness. Extracts were then re-dissolved in their respective solvents to obtain final concentrations of 25, 50, 75, 100 and 125 mg/ml for each plant.

Antimicrobial Assay

Cultures of the fungi and bacteria were obtained from MTCC, Chandigarh and Division of Microbiology, IARI, New Delhi. Bacterial cultures used were *Bacillus macerans* and *Staphylococcus aureus*, (both gram positive), *Pseudomonas aeruginosa* and *Pseudomonas striata*, (both gram negative) and culture of fungi used was *Aspergillus niger*. Bacteria were grown in nutrient agar slants for sub-culturing. From these slants, inoculums were taken and test tubes containing about 10 ml of LB broth were inoculated separately with each bacterial culture and after inoculation, these test tubes were kept at 37° C for overnight or more upto desired growth of the bacteria. This LB broth containing bacterial culture was used for antimicrobial assays of various extracts from different plants.

The fungal culture was further sub-cultured in Potato Dextrose Agar (PDA) media. Slants were made in test tubes by dissolving the required quantity of solid PDA media powder in distilled water as per directions of manufacturers and test tubes were inoculated with fungal cultures. From these slants, inoculum was taken and test tubes containing about 10 ml of Potato Dextrose media were inoculated separately with fungal culture and after inoculation, these test tubes were kept at 27°C. Cultures prepared in this way were used for antifungal assays.

For assaying antibacterial activity, the agar well diffusion method^{42,43} was used with minor modifications. About 20 ml of Nutrient agar media was poured into the Petri plates. Once the agar got solidified, culture of bacteria was spread after mixing with small amount of LB broth. Nutrient agar plates were then punched with a six millimeter diameter cork borer to prepare wells. These wells were then filled with about 50 μ l of the plant extract of desired concentration level. Simultaneously, streptomycin was used as positive control. Similarly a negative control was also tested using different solvents. The test was carried out in triplicates. The plates were incubated at 35°C for 24 hours. Zone of inhibition was then measured using a scale. The antimicrobial activity in terms of percentage

relative inhibition zone diameter (RIZD) was also calculated by applying the expression:

$$\%RIZD = \frac{IZD \text{ sample} - IZD \text{ negative control}}{IZD \text{ antibiotic standard}} \times 100$$

Where, RIZD is the relative inhibition zone diameter (mm). The resulting IZD of the samples were either higher than or equal to IZD of the blanks. Higher values of IZD of sample than blank was considered positive and their equal values were considered negative. Streptomycin (25mg/ml) was used as standard antibacterial drug for the purpose. Similarly antifungal activity was also assayed using agar well diffusion method.

The minimal inhibitory concentration (MIC) was determined for the various extracts of the different plants by agar well diffusion technique. Serial dilutions were prepared by diluting in respective solvents to achieve a decreasing concentration range of 125 to 25 mg/ml. A 50 μ l volume of each dilution was introduced in three wells into Nutrient agar plates already seeded with the standardized inoculum of different bacterial cells. All test plates were incubated at 37°C for 24 hours. The least concentration of each extract showing a clear zone of inhibition was taken as the MIC.

Results and Discussion

Taxonomy and Ethnobotany

Previously all these three plants were included in the family euphorbiaceae. As per the latest APG classification, these have been rearranged and now *E. hirta* and *C. bonplandianum* are in euphorbiaceae and *P. fraternus* has been assigned to the family phyllanthaceae⁴³. Followings are the nomenclature references, brief description and ethnobotanical uses of all the three plants- (1) *Euphorbia hirta* Linn. Sp. Pl. 454; Hooker, Fl. Br. Ind. V:252; Duthie, FUGP. 3:80; Merr. Enum. 2:462; Sabnis, Contrib. Fl. Pun. 562; Maheshw., Fl. Delhi 312; Nair, Fl. Pun. Pl. 237; Jain, Fl. Har. 187; *E. pilulifera* Auct. Pl. (non Linn); Fl. Br. Ind. V: 250; Bamber, Pun. Plants, 137; Chamaesyce *hirta* (L) Millsp. Publ. Field Columb. Mus., Bot. Ser. 2: 303. As per the latest classification, this plant belongs to the family euphorbiaceae, subfamily euphorbioideae and tribe euphorbieae. It is a common prostrate or ascending annual herb with

branching from the rootstock. Leaves are opposite, dark green or reddish above, whitish-villous beneath, elliptic or ovate-oblong, margin finely serrate. Inflorescence a terminal or axillary cluster of flowers, called a 'cyathium'. Cythia clustered in dense, crowded cymes. Involucres stalked, cup shaped, each involucre containing one female flower surrounded by many male flowers, female flowers with pedicel, male flowers sessile, perianth absent, capsule is acutely 3-lobed. This plant is commonly found in North Indian plains. In the Panipat district of Haryana, these plants were found to be used mainly by the non-resident persons living here in the area for labour work. They used this for curing of many skin disorders like warts, cuts and also used aerial portion in dysentery. From local villagers, only one use i.e. used as vegetable was recorded.

(2) *Croton bonplandianum* Baill. Adans. 4:339; *C. bonplandianus* (Sphalm.) DC. Prodr. 15(2):671; Maheshw., Fl. Delhi 315; Raizada, Suppl. FUGP. 243; Nair, Fl. Pun. Pl. 234; Jain, Fl. Har. 185; *C. sparsiflorum* (*C. sparsiflorus* Sphalm.) Morong. Ann N.Y. Acad. Sci. 7:221; Haines, Bot. Bih & Or. 2:105; Gamble, Fl. Pres. Mad. 2:1316; *Oxydectes bonplandiana* (Baill.) Kuntze, Revis. Gen. Pl. 2:610. This plant belongs to the family euphorbiaceae, subfamily crotonoideae and tribe crotonae. It is an erect diffuse much branched annual, about 60 cm high herb. Branches ribbed with stellate hairs. Leaves are simple, ovate-lanceolate, serrate with two glands at the base. Inflorescence is a terminal erect androgynous spike. Flowers have five sepals and five petals and female flowers below males. Male flowers are whitish with around fifteen stamens and female flowers with two extra floral glands at the base of pedicels. Triangular rounded capsules crowded towards the top of branches. Flowering and fruiting time is from May to October. This plant is most commonly found in agricultural fields, grassy localities along road side in Northern parts of India. This plant is also used mainly by migrated workers. They use it in skin disorders. Its latex/juice is used topically in many skin problems. Less commonly, its juice is also used in Helminthiasis and toothache.

(3) *Phyllanthus fraternus* Webster Contr. Gray Herb. 176:53; Maheshw., Fl. Delhi, 320; Nair, Fl. Pun. Pl. 239; Jain, Fl. Har. 189; *P. niruri* Hook. f. non Linn, Hooker, Fl. Brit. Ind. 5: 298; Duthie, FUGP 3: 98; Bamber, Pun. Plants, 233; Sabnis, Contrib. Fl. Pun. 564. This plant is now placed in family phyllanthaceae, subfamily phyllanthoideae and tribe phyllanthae. It is a monoecious slender erect glabrous annual herb up to 80 cm, stems

angular, branching from the base. Leaves sessile, distichous, overlapping, elliptic-oblong, obtuse or rounded at apex and base, glaucous beneath, flowers axillary, minute, greenish-yellow. Male flowers with six tepals, stamens three; Female flowers with six sepals, styles minute. Fruit a capsule, trilobate-subglobose. Seeds trigonous. It's flowering and fruiting time is from April to October. This weed is found everywhere in grassy fields, gardens and wastelands. *Phyllanthus fraternus* and *P. amarus* are closely related species, latter having narrower leaves, five perianths in both male and female flowers, some axils with both male and female flowers. In *P. fraternus* the leaves are broader, perianth six in both male and female flowers and male and female flowers in separate axils, male towards base and female towards the top. Its ethnobotanical uses are well known. It is used as hepatoprotective agent in one or the other way. Its fresh roots are used in jaundice and other liver problems by many locals. Extract of whole plant with roots are also taken to cure digestive problems.

In Haryana, due to easy availability of medical facilities, dependence of residents on herbal

folk medicines has drastically diminished. Still many persons have a good faith in folk medicines. During interaction with people, it was also recorded that many people having good knowledge of folk herbal medicines are not there in this world now. Because, they could not get a person in the last span of time who has been interested in learning this precious knowledge, so this knowledge vanished with their lives.

Antimicrobial Assay

Scientific evaluation of the antimicrobial activity of widely distributed plants against various types of microbes still remains an area of intensive investigation. In the present study, it has been tried to work out the antimicrobial potential of the three plants of the family euphorbiaceae. Our results as presented in Table 1, 2 and 3 indicate the fair antibacterial potential of the studied plants.

For the antibacterial activity, methanolic extracts of all the three plants namely *C. bonplandianum*, *E. hirta* and *P. fraternus* were found to be most effective, petroleum ether was not effective at all in case of *E. hirta* and *P. fraternus*.

Table 1. Antimicrobial activity of *Croton bonplandianum*, *Euphorbia hirta*, and *Phyllanthus fraternus* (shown by zone of inhibition in mm)

Microorganisms used	Conc. mg/ml	<i>C. bonplandianum</i>			<i>E. hirta</i>			<i>P. fraternus</i>			Control
		Aq	Me	P E	Aq	Me	P E	Aq	Me	P E	
<i>Bacillus macerans</i>	50	-	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	8*	-	-	-	-	-
	100	-	9	6	-	13	-	-	-	-	-
	125	-	13	8	7	17	-	-	-	-	-
<i>Staphylococcus aureus</i>	50	-	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	9	-	-	-	-	-
	100	-	-	-	9	12	-	-	-	-	-
	125	-	-	-	12	13	-	-	9	-	-
<i>Pseudomonas aeruginosa</i>	50	-	-	-	-	7	-	-	-	-	-
	75	-	9	9	-	12	-	-	-	-	-
	100	-	10	8	11	18	-	-	11	-	-
	125	9	18	10	16	21	-	-	15	-	-
<i>Pseudomonas striata</i>	50	-	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	11	-	-	-	-	-
	100	-	-	6	7	14	-	-	-	-	-
	125	-	6	9	13	19	-	-	-	-	-
<i>Aspergillus niger</i>	50	-	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	-	-	-	-	-	-
	100	7	-	-	-	-	-	-	-	-	-
	125	11	-	-	-	7	-	-	-	-	-

* All the values are mean of triplicates. No inhibition zone is denoted by (-). Aq, Me and P E stands for aqueous, methanol and petroleum ether respectively.

Table 2. Percentage of relative inhibition zone diameter (RIZD) in mm for different solvents

Microorganisms used	Conc. mg/ml	<i>C. bonplandianum</i>			<i>E. hirta</i>			<i>P. fraternus</i>		
		Aq	Me	P E	Aq	Me	P E	Aq	Me	P E
<i>Bacillus macerans</i>	50	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	30.7*	-	-	-	-
	100	-	34.6	23.1	-	50.0	-	-	-	-
	125	-	50.0	30.8	26.9	65.4	-	-	-	-
<i>Staphylococcus aureus</i>	50	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	32.1	-	-	-	-
	100	-	-	-	32.1	42.8	-	-	-	-
	125	-	-	-	42.9	46.4	-	-	32.1	-
<i>Pseudomonas aeruginosa</i>	50	-	-	-	-	-	-	-	-	-
	75	-	37.5	37.5	-	50.0	-	-	-	-
	100	37.5	41.7	33.0	45.8	75.0	-	-	-	45.8
	125	-	75.0	41.7	66.7	87.5	-	-	-	62.5
<i>Pseudomonas striata</i>	50	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	45.8	-	-	-	-
	100	-	-	25.0	29.2	58.3	-	-	-	-
	125	-	25.0	37.5	54.2	79.2	-	-	-	-
<i>Aspergillus niger</i>	50	-	-	-	-	-	-	-	-	-
	75	-	-	-	-	-	-	-	-	-
	100	28	-	-	-	-	-	-	-	-
	125	44	-	-	-	28	-	-	-	-

* All the values are mean of triplicates. No RIZD is denoted by (-). Aq, Me and P E stands for aqueous, methanol and petroleum ether respectively

Table 3. MIC for methanolic extracts used against various bacteria

Microorganisms used	<i>C. bonplandianum</i>			<i>E. hirta</i>			<i>P. fraternus</i>		
	Aq	Me	P E	Aq	Me	P E	Aq	Me	P E
<i>Bacillus macerans</i>	-	87.5*	100	125	62.5	-	-	-	-
<i>Staphylococcus aureus</i>	-	-	-	87.5	62.5	-	-	112.5	-
<i>Pseudomonas aeruginosa</i>	125	37.5	62.5	87.5	50.0	-	-	87.5	-
<i>Pseudomonas striata</i>	-	125.0	100.0	87.5	62.5	-	-	-	-
<i>Aspergillus niger</i>	100.0	-	-	100.0	125.0	-	-	-	-

* All the values are mean of triplicates. No inhibition zone is denoted by (-). Aq, Me and P E stands for aqueous, methanol and petroleum ether respectively

For the methanolic extracts, *Pseudomonas aeruginosa* was most susceptible. *S. aureus* was observed to be least susceptible. It is clear from the RIZD data that methanolic extracts were able to control the growth up to 87.5% as compared to standard antibiotic used (Fig. 1 and 2). MIC of methanolic extract was more or less same for all the four bacterial strains i.e. in the range of 50.0 to 62.5 mg/ml in *E. hirta*. In *C. bonplandianum* and *P. fraternus*, it was found to be varied between 37.5 to 125.0 mg/ml. However aqueous extracts were also effective but not as much as methanolic extracts. In case of *E. hirta*, aqueous extracts have also shown good results giving maximum RIZD value of 66.7% but in *C. bonplandianum* and *P. fraternus*, aqueous extracts could not get proved so useful. In *C. bonplandianum*, aqueous extracts were effective against the *P. aeruginosa* and *A. niger* upto some extent.

Our results support the work of many researches^{20, 22, 23, 45, 46}. In many studies carried out by various workers, it has been frequently reported that alcoholic extracts generally shows greater activity as compared to other solvents like water, petroleum ether etc⁴⁷. This may be due to the nature of the alcohols to dissolve the organic compounds better than water. However, this can not explain, why activities of petroleum ether extracts were very poor.

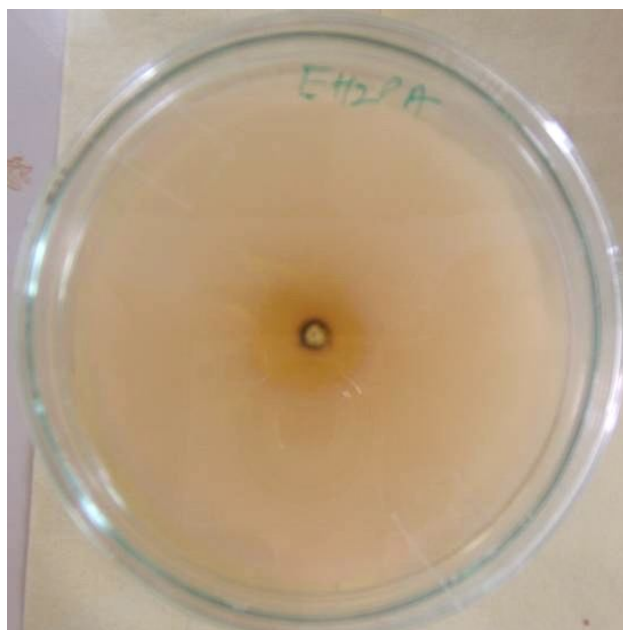


Fig. 1. Activity of the methanolic extract of *Euphorbia hirta* against *Pseudomonas aeruginosa* at 125 mg/ml concentration

In the present studies, water extract of *E. hirta* has shown the antibacterial potential upto some extent, some contradict reports are also available⁴⁸. They have found that aqueous extract could not inhibit the growth of as many as 10 tested bacterial strains including *Pseudomonas aeruginosa*. Regarding antibacterial potential of *C. bonplandianum*, only a few reports could be found through literature survey and internet resources^{45,49}. These studies also support our studies as these workers have also shown the antibacterial activity of alcoholic and petroleum ether extracts. No antifungal activity with organic solvents was reported⁴⁹, however antifungal activity was reported in our case with aqueous extract only.

Amongst the gram positive and gram negative bacteria used in the present study, both were found to be susceptible to the plant extracts but gram negative have shown somewhat more susceptibility. This is in contradiction with previous findings⁵⁰. This may be due to the individual behavior of the strains used. Moreover in the present study, only a few strains were used and hence it may not be accurately predicate the susceptibility of gram positive and gram negative strains on the basis of our studies.

Successful prediction of phytochemicals is largely dependent on the type of solvent used and portion of plant material used. The traditional healers make use of water primarily as a solvent

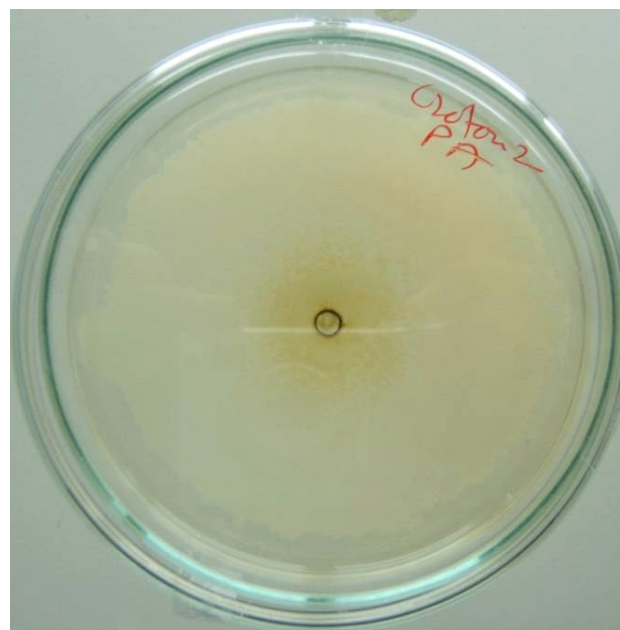


Fig. 2. Activity of the methanolic extract of *Croton bonplandianum* against *Pseudomonas aeruginosa* at 125 mg/ml concentration

but our studies showed that methanol extracts of the plants studied were certainly much better and powerful. This may be due to the better solubility of the active components in organic solvents⁴⁷. Despite of using the water as a solvent, lot of practitioners has been able to cure the ailments. This can be explained by the fact that they generally apply whole crushed plant preparation rather than extracts. Moreover they generally use decoctions and other preparations in combinations i.e. preparations of many plants simultaneously.

From our studies of screening these three plants, the results obtained confirm the therapeutic potency of these plants used in traditional medicine. This type of studies forms a good basis for selection of candidate plant species for further phytochemicals and pharmacological investigations.

In conclusion, methanolic extracts of *Euphorbia hirta* posses a broad spectrum of activity against many bacteria. These extracts with antimicrobial activity open the possibility of finding new clinically effective antibacterial compounds. For the antifungal activity, none of the plant could provide promising results.

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