
**ISSN Print:** 2394-7500
**ISSN Online:** 2394-5869
**Impact Factor:** 5.2
IJAR 2018; 4(12): 441-444
www.allresearchjournal.com
Received: 12-10-2018
Accepted: 16-11-2018

**Priyanka**
Plant Pathology and Microbiology Laboratory, Department of Botany, Patna University, Patna, Bihar, India

**Corresponding Author:**
**Priyanka**
Plant Pathology and Microbiology Laboratory, Department of Botany, Patna University, Patna, Bihar, India

# The ethanolic extracts of *Oxalis corniculata* shows high antimycotic activities against *Mucor* and *Rhizopus* for food preservation

## Priyanka

**Abstract**
Plants contain several biologically active compounds that are potentially antimicrobial**.** Food contamination and spoilage in baking industries need to be controlled using natural bio preservatives rather than chemical additives which are being outlooked today because of health and safety concerns. The present study evaluates the antifungal potential of five medicinal plants in their aqueous and ethanolic extract. The different concentrations of these extracts were screened against the major spoilage organisms *Mucor* and *Rhizopus* isolates from deteriorated bakery products and accordingly the radial growth of hyphae was measured. The ethanolic extracts of all the four test plants were found to be more efficient than the aqueous preparation. Among the tested species *Oxalis corniculata* was most responsive and showed maximum fungal inhibition for *Mucor* (90.77%) and Rhizopus (88.89%). These findings could help these extracts to be used as safer ingredient as natural bio preservative with antimycotic property.

**Keywords:** Antimycotic, biopreservative, ethanolic extract, hyphae, *Mucor*, *Rhizopus*

## Introduction
Bakery industry in India is probably the largest among the processed food industries. The annual production of bakery products, breads, biscuits, pastries, cakes and buns in India is increasing steadily and estimated to be in excess of 30 lakh tonnes annually. The most frequent problem, occurring in baking is mold contamination and rope spoilage.
Microorganisms in food products may cause spoilage which contributes to the deterioration in safety, flavour, texture and colour of the product and finally resulting in food-borne diseases (Decker *et al.*, 1995) [1]. To extend shelf life of food products and to ensure food safety, chemical preservatives such as sorbic acid, benzoic acid, propionic acid and their salts, are widely used as chemical preservatives. But they are responsible for many carcinogenic and teratogenic attributes. So the use of these additives is regulated and limited by law, and their use must be stated on the product's label. However, today consumers demand less use of synthetic or chemical additives (*Membre et al.* 2001) [2]. Thus the exploration of naturally occurring antimicrobial for food preservations receives increasing attention. The potential sources of natural antimicrobial products and preservatives are spices, herbs, fruits, seeds, leaves, barks and roots. In addition to boosting flavour, spices and herbs are also known for their preservative and medicinal values. Attention of the Scientific community worldwide is shifting towards spices and herbs to harness their antimicrobial properties for use as natural food preservatives and nutraceuticals (*Chattopadhyay* and *Bhattacharya*, 2007) [3].
The objective of this study was to evaluate the antifungal activity of ethanolic extracts and aqueous extracts of four commonly growing medicinal plants.

## Materials and Methods
1. Four different medicinal plant parts listed in Table-1 were collected in their natural habitat from local areas of Patna. The plant was authenticated by taxonomists from Botany Department, P.U., and Patna.
2. Preparation of Extract: Plant extracts were prepared from different plant samples taken.

The plants collected were cut into small pieces, properly dried in shade for 48 hours approximately at ambient temperature under laboratory conditions.

After drying the pieces were crushed to fine powder in electric grinder, sealed in polythene bags and stored away from light and moisture until used for extraction (*Kra et al.,* 2014) [13].

The aqueous and ethanolic extracts was prepared from the dried powder of various plant parts. Twenty five grams of powder was extracted in 100 ml sterile distilled water and ethanol in sterile flasks separately. The flasks were kept at room temperature. After 48 hours, the plant extracts were filtered through whatmann filter paper No. 1 and kept for use.

3. Screening of antimycotic activity of selected medicinal plants against the isolated Molds: *In vitro* evaluation of medicinal plants taken like stem and leaf of *oxalis corniculata*, *Solanum nigrum*, leaves of *Bauhinia variegata* and *Cymbopogon citratus.*

Antifungal screening of these plants extracts were done against food borne moulds viz. *Mucor spp.* and *Rhizopus spp.* isolated from bun.

The extracts were screened for antimicrobial activity using the poisoned food technique (*Singh* and *Tripathi,* 1999) [5].

- 20 ml of Sabouraud's Dextrose Agar (SDA) mixed with 5 ml of aqueous and ethanolic plant extract separately just before solidification. 5 mm disc of culture of *Mucor* and *Rhizopus* was placed in each Petri Plate. Experiment was conducted in triplicate. Medium with Sorbic acid served as positive control whereas without plant extract served as negative control. The radial growth of mycelium was measured as the average of two to three diameters at right angles to one another at 24 hours interval till the control grew to cover the entire plate. The per cent inhibition of growth was calculated according to following formula**: -** % inhibition = $\frac{dc-dt}{dc}$ x 100 where dc = Average in Diameter of growth in control plate. dt = Average increase in mycelia growth in treatment (Singh and Tripathi, 1999) [5].

## Result

The traditional use of plants as medicines provide the basis for indicating which essential oils and plant oils may be useful for specific medical conditions. Historically many plant oils and extracts, such as tea tree, myrrh and clove, have been used as topical antiseptics, or have been reported to have antimicrobial properties (Lawless, 1995) [10].

Four medicinal plants were screened for their antifungal activity against the spoilage molds. The results have been depicted in Table 1 and illustrated in Fig. 2 and 3.

**Table 1:** Antimicrobial activity of *Bauhinia variegata, Oxalis corniculata, Cymbopogon Citratus* and *Solanum nigrum* in growth (mm) and per cent inhibition of *Mucor* and *Rhizopus*

| Sl. No. | Plants Samples | Plant Parts used in different solvents with control | *Mucor* | | *Rhizopus* | |
|---|---|---|---|---|---|---|
| | | | Mycelial growth (mm) | % inhibition | Mycelial growth (mm) | % inhibition |
| | | Negative control | 90 | 0 | 90 | 0 |
| | | Positive control | 0 | 100 | 0 | 100 |
| 1. | *Bauhinia variegata* | Aqueous | 43.5 | 51.66 | 40.33 | 55.18 |
| | | Ethanolic | 21.67 | 77.03 | 18.33 | 79.63 |
| 2. | *Oxalis corniculata* | Aqueous | 39.67 | 55.92 | 40.60 | 54.80 |
| | | Ethanolic | 8.3 | 90.77 | 10.0 | 88.89 |
| 3. | *Cymbopogon Citratus* | Aqueous | - | - | - | - |
| | | Ethanolic | 62.54 | 30.51 | 58.77 | 34.71 |
| 4. | *Solanum nigrum* | Aqueous | 41.0 | 54.44 | 43.0 | 52.22 |
| | | Ethanolic | 14.67 | 83.70 | 9.3 | 89.67 |

- No inhibition

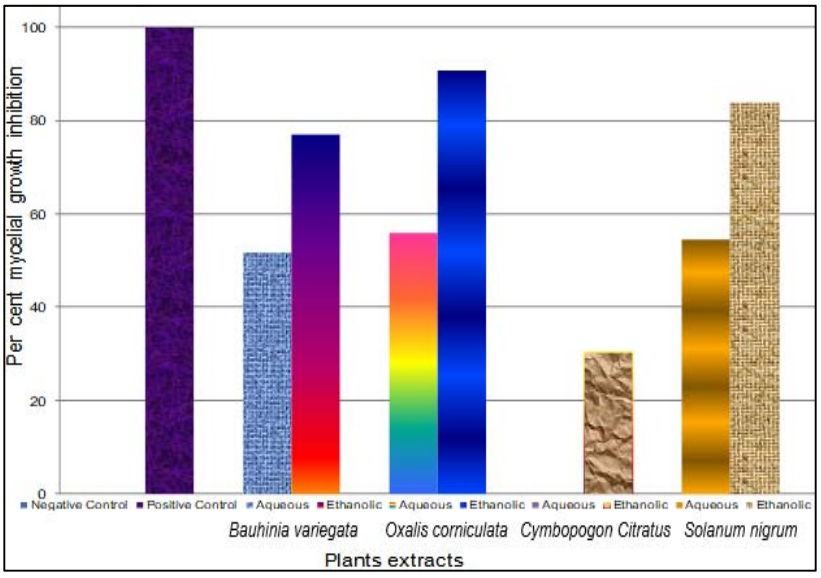


**Fig 1:** Antlfungal activity of aqueous and ethanolic plant extracts against *Mucor* spp. By polsoned food technique

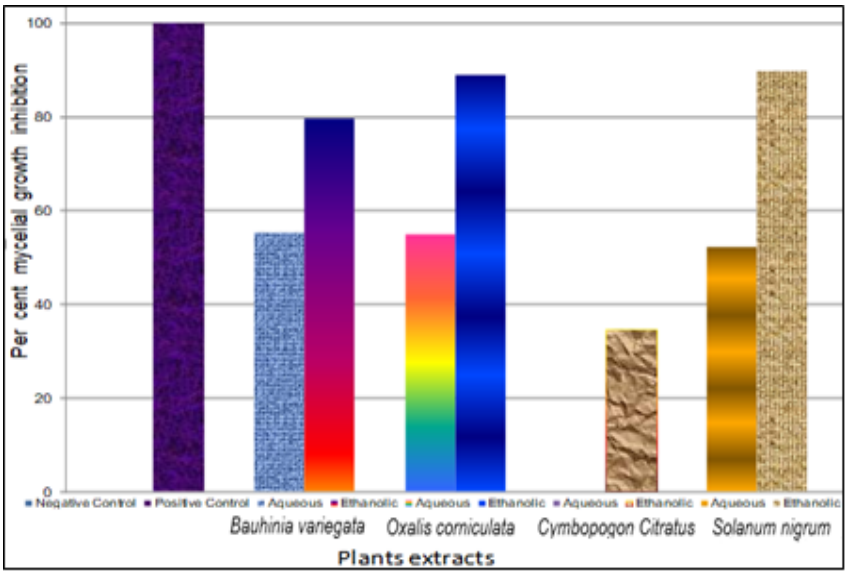


**Fig 2:** Antlfungal activity of aqueous and ethanolic plant extracts against *Rhizopus* spp. By polsoned food technique

Data presented in the Table clearly showed that both aqueous and ethanolic extract were found effective in inhibition of the test molds. Ethanolic extract of all the medicinal plants had more inhibitory effect as compared to aqueous extract. Aqueous extract of *Cympopogon citratus* failed to inhibit the molds.

Ethanolic extract of *oxalis corniculata* was found to be most pronounced to the extent of 90.77 in case of *Mucor spp.* and 88.89 per cent in case of *Rhizopus spp.*

Ethanolic extract of *Solanum nigrum* prevented the growth of *Mucor* to the extent of 83.70 and 89.67 in case of *Rhizopus* followed by *Bauhinia variegata* suppressing 77.03 and 79.63per cent in case of *Mucor and Rhizopus* respectively. Earlier studies of research showed that *S. nigrum* showed higher potential of antimicrobial activity against all fungal forms (Ikeda *et al. 2000;* Qureshi *et al. 1997;* Katsura *et al. 2001*) [6, 8, 7].

Tannin is present in *Oxalis corniculata.* Herbs that have tannins as their main component are astringent in nature and are used for treating intestinal disorders such as diarrhea and dysentry (Dharmananda, 2003) [9] thus exhibiting antimicrobial activity.

## Discussion

All undertaken plants extracts inhibited different degrees of antimycotic activities against the isolated spoilage moulds viz. *Mucor* and *Rhizopus.*

Ethanolic extracts provided more consistent and prominent antifungal activity as compared to aqueous one. None of the aqueous extracts were found much effective against any of the assayed molds. Water extract may contain a low concentration of fungal compounds or may not extract antifungal compounds or all of the identified components from plants active against microorganisms aromatic or saturated organic compounds are most often obtained through initial ethanol or methanol extraction (*Cowan,* 1999) [4].

## Conclusion

Recent consumers and manufacturers who are now aware of the negative health impact of chemical preservative. So now-a-days trend towards natural preservative is in demand. Many medicinal plants with antimicrobial action have been investigated, but very few have been exploited as chemical free food preservatives commercially.

The present investigation reveals that among 4 plant extracts oxalis and solanum plant extracts possess potent antimold activity and can be opted as herbal preservative.

## References

1. Decker EA, Chan WKM, Livisay SA, Butterfield DA, and Faustman, C. J Food Sci 1995;23:1201-1204.
2. Membre JM, Kubaozka M, Chene C. Growth rate and growth-no-growth interface of pH and preservative acids. Food mircobiol 2001;18:531-538.
3. Chattopadhyay RR, Bhattacharya SK. Herbal spices as alternative antimicrobial food preservatives; An update. Pharm. Rev 2007;1:239-247.
4. Cowan MM. Plant products as antimicrobial agents. Clin Microbiol Rev 1999;12:564-82.
5. Singh J, Tripathi NN. Inhibition of storage funji of blackgram (Vigna mungo) by some essential oils. Flavour and fragrance Journal 1999;14:1-4.
6. Ikeda T, Tsumagari H, Nohara H, Nohara T, Steroidal oligoglycosides from Solanum nigrum. Chemical and Pharmaceutical Bulletin 2000;48(7):1062-1064
7. Katsura H, Sukiyama RT, Suzuki A, Kobayashi M. Invitro antimicrobial activity of bakuchiol against oral microorganisms. Antimicrobial agents & Chemotherapy. Antimicrobial agents & Chemical Journal. 2001;45:3009-3013.
8. Qureshi S, Rai MK, Agrawal SC. Invitro evaluation of inhibitory nature of extract of eighteen plant species of Chhindwara against three keratinophilic fungi. Hindustan Antibiotic Bulletin 1997;39(1-4):56-60.
9. Dharmananda S. Gallnuts and the uses of Tannins in chinese medicine - A paper delivered at institute for Traditional Medicine, Portland, Oregon.
10. Lawless J. The illustrated Encyclopedia of Essential oils .Shaftesbury, UK: Element Books Ltd., 1995.
11. Yayé YG, Ackah JAAB, Kra AKM, Djaman AJ. Antifungal activity of different extracts of Terminalia mantaly H. Perrier on the in vitro growth of Aspergillus

fumigatus. European Journal of Sciences Resources 2012; 82:132-138.
12. Ouattara S, Kporou KE, Kra AKM, Zirihi GN, N'guessan JD, Coulibaly A, Djaman AJ. Antifungal activities of Terminalia ivorensis A. Chev. Bark extracts against Candida albicans and Aspergillus fumigatus. Journal of Intercultural Ethnopharmacology 2013a;2:49-52.
13. Kra AKM, Ahon GM, Djo-Bi D, Ouattara S, Coulibaly A, Djaman AJ. Antifungalactivities of medicinal plants extracts of Ivorian pharmacopoeia. Journal of Intercultural Ethnopharmacology 2014;3:159-166.