Antifungal Activity of Some Latex against Seed-Borne Pathogenic Fungi

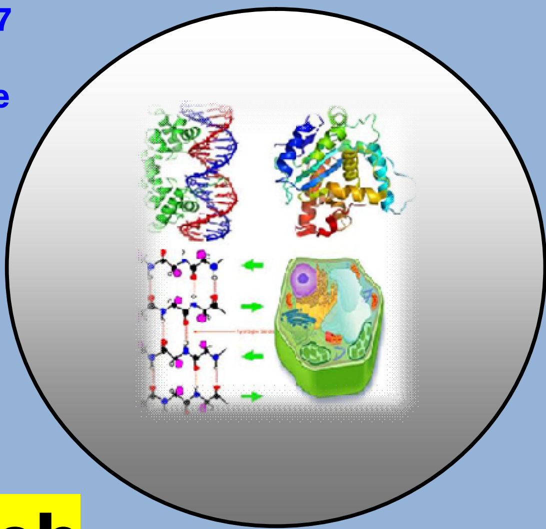
By

B. T. Pawar

ISSN 0970-4973 Print
ISSN 2319-3077 Online/Electronic

Global Impact factor of Journal: 0.756
Scientific Journals Impact Factor: 2.597
Index Copernicus International Value
IC Value of Journal 4.21 Poland, Europe

J. Biol. Chem. Research
Volume 32 (1) 2015 Pages No. 183-187



Journal of Biological and Chemical Research

An International Journal of Life Sciences and Chemistry

Indexed, Abstracted and Cited in Various National and International Scientific Databases of the World

Published by Society for Advancement of Sciences®

J. Biol. Chem. Research. Vol. 32, No. 1: 183-187, 2015
(An International Journal of Life Sciences and Chemistry)
Ms 32/1/09/2015, All rights reserved
ISSN 0970-4973 (Print)
ISSN 2319-3077 (Online/Electronic)

B. T. PAWAR

http:// www.jbcr.in
jbiolchemres@gmail.com
info@jbcr.in

RESEARCH PAPER

Received: 12/11/2014 Revised: 01/01/2015 Accepted: 03/01/2015

Antifungal Activity of Some Latex against Seed-Borne Pathogenic Fungi

B. T. Pawar

Research Centre in Botany, Shri Muktanand College, Gangapur, District Aurangabad – 431 109, Maharashtra, India

ABSTRACT

Plant extracts and plant products are being used to control the diseases since last several years. Latex of the various plants is found to be effective against seed-borne pathogenic fungi. The in vitro studies have been performed by using cup-plate method to examine the antifungal activity of some latex. Latex of 9 plants was screened against 5 seed-borne pathogenic fungi viz. Alternaria alternata, Aspergillus niger, Curvularia lunata, Fusarium moniliforme and Trichoderma viride. Latex of 5 plants showed antifungal activity. The latex of Jatropha curcas showed maximum activity (Mean activity zone 18.20 mm); while minimum activity was observed with latex of Carica papaya (Mean activity zone 14.60 mm). The latex collected from Alstonia scholaris, Ficus benghalensis, F. elastic and F. racemosa was unable to exhibit any activity against the fungi under investigation. These plant extracts can possibly be exploited in the management of seed-borne pathogenic fungi to prevent biodeterioration of seeds in an eco-friendly way.

Key Words: Antifungal activity, Seed-borne Pathogenic Fungi, Biodeterioration, and Latex.

INTRODUCTION

Fungal diseases are known to cause great damages all over the world. Different species of *Alternaria, Aspergillus, Ceratobasidium, Cercospora, Cochliobolus, Curvularia, Dreschslera, Fusarium, Gaeumannomyces, Microdochium, Penicillium, Pyricularia, Pythium, Rhizoctonia, Rhizopus, Sclerophthora, Trichoderma* and *Tricoconella* are most common associates of seeds all over the world, causing pre and post-infections and considerable quality losses *viz.* seed abortion, seed rot, seed necrosis, reduction or elimination of germination capacity, seedling damage and their nutritive value have been reported (Miller, 1995; Janardhana *et al.,* 1998; Kavitha *et al.,* 2005). Seed treatment is the safest and the cheapest way of control of seed-borne fungal diseases and to prevent biodeterioration of grains (Chandler, 2005; Bagga and Sharma, 2006).

Even though effective and efficient control of seed-borne fungi can be achieved by the use synthetic chemical fungicides, the same cannot be applied to grains for reasons of pesticide toxicity (Harris *et al*., 2001). The toxic effect of synthetic chemicals can be overcome, only by persistent search for new and safer pesticides accompanied by wide use of pest control methods, which are eco-friendly and effective (Mohana *et al.,* 2011). Green plants represent a reservoir of effective chemotherapeutants and can provide valuable sources of natural pesticides (Balandrin *et al.,* 1985; Hostettmann and Wolfender, 1997). The latex is widely used in cosmetics, pharmaceuticals, food, paper, textile and petroleum industries (Madhavi *et al,* 2013). Daruliza *et al*, (2011) reported that the *Hevea brasiliensis* latex C-serum exerted a specific antifungal activity against *Aspergillus niger*. Hussain *et al*, (2014) performed an *in-vitro* comparative study for antimicrobial activity of fresh latex, juice and extract of *Euphorbia hirta* and *Euphorbia thymifolia.* They concluded that the fresh latex of the *E. hirta* is a potentially good candidate for the therapy of antibacterial resistant bacteria and suggested further study. Saadabi *et al*, (2012) evaluated leaves, stems, fruits and latex of *Calotropis procera* extracts against four types of bacteria and two types of fungi i.e. *Aspergillus niger* and *Candida albicans.* They clearly noticed that the latex of the plant had a broad spectrum activity against bacteria and fungi under investigation. Vashist & Jindal (2012) reported antifungal activity of latex of *Calotropis gigantean* against fungi *viz. C. albicans,Saccharomyces cerevisiae, Trichophyton mentagrophytes, Trichophyton rubrum, A. fumigates, A. lavus, A. niger, Penicillium chrysogenum.*

MATERIALS AND METHOD

Fungal pathogens were isolated on PDA medium from different stored seeds. Identified fungal cultures were isolated and pure cultures of each fungi made separately on PDA slants. These pure cultures were used for further investigation.

a) Collection of Latex: Fresh latex of the plants was collected from the fields and used for the study (Pawar, 1999).

b) Cup Plate Method: 20 ml of PDA media was poured in sterilized petridishes (9 cm diameter) and allowed to solidify. Then pure cultures of fungi were streaked out in regular intervals on the media poured in petridishes. In the centre of the medium, a cup cavity of 8 mm diameter was made with sterilized No. 4 cork borer. This cup was filled with 0.1 ml of the stem extract (Pawar and Papdiwal, 2010). The petridishes were incubated for 6 days at 30±2°C temperature and the observations were recorded as diameter of inhibitory zone in mm. Cup plate filled with sterile distilled water was used as control in all the experiments (Pawar, 2013). All the experiments were in triplicate and mean has been considered in observation table.

RESULTS AND DISCUSSION

The antifungal activity of latex of 9 plants against 5 seed-borne fungi is presented in table 1 as zone of inhibition (in mm). It was observed from table 1 that out of 9 latex tested, latex of 5 plants showed antifungal activity; out of which *Jatropha curcas* showed maximum activity (Mean activity zone 18.60 mm), followed by latex of *Calotropis gigantea* (Mean activity zone 18.20 mm) and minimum activity was observed with *Carica papaya* latex (Mean activity zone 14.60 mm).

While latex of *Michelia champaca* and *Moringa oleifera* also showed good antifungal activity; however, latex of *Alstonia scholaris, Ficus benghalensis, Ficus elastic* and *Ficus recemosa* could not show any antifungal activity against the fungi under investigation.

Table 1. Antifungal activity of Root Extracts against Seed-borne Pathogenic Fungi.

Sr. No	Name of the Plant	Zone of Inhibition (in mm)					
		Alternaria alternate	*Aspergillus niger*	*Curvularia lunata*	*Fusarium moniliforme*	*Trichoderma viride*	Mean
1	*Alstonia scholaris* (L.) R. Br.	–	–	–	–	–	**–**
2	*Calotropis gigantea* (L.) R. Br.	18	19	17	18	19	**18.20**
3	*Carica papaya* L.	15	14	14	14	16	**14.60**
4	*Michelia champaca* L.	15	16	15	15	16	**15.40**
5	*Ficus benghalensis* L.	–	–	–	–	–	**–**
6	*Ficus elastica* Roxb.	–	–	–	–	–	**–**
7	*Ficus recemosa* L.	–	–	–	–	–	**–**
8	*Jatropha curcas* L.	18	19	18	18	20	**18.60**
9	*Moringa oleifera* Lamk.	17	16	17	18	16	**16.80**

–: No Activity.

Similar results were reported by Kumar *et al*, (2010). They tested antimicrobial activity of crude aqueous extract of latex of *Calotropis gigantean* against six pathogenic species of bacteria and two species of fungi *viz. C. krusei* and *A. niger*. Murugan (2012) also reported antimicrobial activity of leaves extract and latex of *C. gigantean.* Sharma *et al*, (2010) reported broad-spectrum antimicrobial properties of *Jatropha curcas.* Mbakwem-Aniebo *et al*, (2012) also studied effects of *J. curcas* leaves on common Dermatophytes and causative agent of Pityriasis versicolor in Rivers State of Nigeria

ACKNOWLEDGEMENTS

Author is thankful to The Principal, Shri Muktanand College, Gangapur, for providing necessary facilities and support.

REFERENCES

Bagga, P.S. and V.K. Sharma 2006**.** Evaluation of fungicides as seedling treatment for controlling bakanae/foot-rot (*Fusarium moniliforme*) disease in basmati rice. *J. Mycol. Plant Pathol.,* **59**: 305–308.

Balandrin, M.F., J.A. Klocke, E.S. Wurtele and W.H. Bollinger, 1985**.** Natural plant chemicals : Sources of Industrial and Medicinal materials, *Science,* **228**: 1154-1160.

Chandler, J. 2005**.** Cost reduction in SIT programmes using exosect auto-dissemination as part of area wide integrated pest management. *Int. J. Pest Control,* **42**(2): 257–260.

Daruliza, K.M.A., K.L. Lam, K.L. Yang, J.T. Priscilla, E. Sunderasan and M.T. Ong 2011**,** Anti-fungal effect of *Hevea brasiliensis* latex C-serum on *Aspergillus niger*. *European Review for Medical and Pharmacological Sciences,* **15**: 1027-1033.

Harris, C.A., M.J. Renfrew and M.W. Woolridge 2001, Assessing the risk of pesticide residues to consumers: recent and future developments*.* Food Additiv. *Contam*, **18**(12): 1124–1129.

Hostettmann, K. and J. Wolfender 1997**.** The search for Biological active secondary metabolites. *Pesticides Science,* **51**: 471-482.

Hussain, M., U. Farooq, M. Rashid, H. Bakhsh, A. Majeed, I.A. Khan, S.L. Rana, M. Shafeeq-ur-Rahman and A. Aziz, 2014**.** Antimicrobial activity of fresh latex, juice and extract of *Euphorbia hirta* and *Euphorbia thymifolia* an *in-vitro* comparative study. *International Journal of Pharma Sciences,* **4** (3): 546-553.

Janardhana, G.R., K.A. Raveesha and H.S. Shetty, 1998, Modified atmosphere storage to prevent mould-induced nutritional loss in maize. *J. Sci. Food Agric.* **76**(4): 573–578.

Kavitha, R., S.Umesha and H.S. Shetty, 2005**,** Dose dependent impact of dominant seed-borne fungi on seed germination and seedling vigour of cotton seeds. *Seed Res.* **33**(2): 187–194.

Kumar, G., L. Karthik and K.V. Bhaskara Rao, 2010**,** Antimicrobial activity of latex of *Calotropis Gigantea* against pathogenic microorganisms - An *in-vitro* study. *Pharmacologyonline,* **3**: 155-163.

Miller, J.D. 1995**,** Fungi and mycotoxins in grain implications for stored product. *Research. J. Stored Product Res*. **31**(1): 1–16.

Madhavi Y., K.V. Ragahava Rao, Ch. Ravi Kiran, and T. Raghava Rao, 2013**,** Studies on phytochemical analysis and antimicrobial activity of *Artocarpus heterophyllus* fruit latex against selected pathogenic microorganisms. *International Journal of Scientific & Engineering Research,* **4**(10): 1458-1468.

Mbakwem-Aniebo, C., E.P. Okoyomo, C.J. Ogugbue and I.O. Okonko, 2012**,** Effects of *Jatropha curcas* leaves on common Dermatophytes and causative agent of Pityriasis versicolor in Rivers State, Nigeria. Nature and Science, **10**(12): 151-157.

Mohana, D.C., P. Prasad, V. Vijaykumar and A.R. Koteshwara, 2011**,** Plant extract effect on Seed-borne pathogenic fungi from seeds of paddy grown in southern India. *Journal of plant Protection Research*, **51**(2): 101-106.

Murugan, T. 2012**,** Antimicrobial activity of leaves and latex extract of the herbal plant *Calotropis gigantea* (Erukku in Tamil). *International Journal of Biology, Pharmacy and Allied Sciecnes*, **1**(3): 261-270.

Pawar, B.G. (1999) *Studies on the utilization of plant extracts for the management of Phytopathogenic bacteria.* Ph.D. thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

Pawar, B.T. 2013**,** Antifungal activity of some root extracts against seed-borne pathogenic fungi. Flora and Fauna, **19**(2): 259-262.

Pawar, B.T. and P.B. Papdiwal, 2010, Antibacterial activity of some leaf extract against *Xanthomonas campestris* pv. *mangiferaeindicae, International Journal of Plant Protection*, 3(1): 104-106.

Saadabi, A.M.A., N.M. Ali, H.I. Mohammed, F.N. Alsafi and H.B. Mustafa 2012**,** An *in-vitro* antimicrobial activity of Calotrpis procera (Ait.) R.Br. extracts on certain groups of pathogenic micro-organisms. Research Journal of Medicinal Sciences, **6**(1): 13-17.

Sharma, A., S. Saxena, U. Rani, S. Rajore and A. Batra 2010**,** Broad-spectrum antimicrobial properties of medicinally important plant *Jatropha Curcas* L. *International Journal of Pharmaceutical Sciences Review and Research,* **4**(3): 11-14.

Vashist, H. and A. Jindal 2012**,** Antimicrobial Activities of Medicinal Plants- Review. *International Journal of Research in Pharmaceutical and Biomedical Sciences,* **3**(1): 222-230.

Corresponding author: Dr. B. T. Pawar, Research Centre in Botany, Shri Muktanand College, Gangapur, District. Aurangabad – 431 109, Maharashtra, India.
Email: drbtpawar@gmail.com