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Synthesis and antifungal activity of N-bromonicotinamide (NBN)

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SUMMARY

N-Bromonicotinamide (nbn) was synthesized and screened for antifungal activity against *Aspergillus restrictus, Candida albicans, Cladosporium herbarum, Fusarium oxysporum, Penicillium chrysogenum* and *Rhizoctonia solani*. N-Bromonicotinamide showed total inhibition to all these fungi at 1000 ppm concentration, whereas it showed 75 per cent growth inhibition for *A. restrictus, C. herbarum, F. oxysporum, P. chrysogenum* and *R. solani* and 50 per cent growth inhibition for *C. albicans* at 500 ppm concentration. At lower concentration (250 ppm) of NBN *A. restrictus, C. herbarum, F. oxysporum* and *R. solani* showed 50 per cent growth inhibition, whereas in *C. albicans* with 75 per cent growth inhibition was observed. For *P. chrysogenuus*, the lower concentration do not show any inhibition. Hence, NBN at 1000 ppm concentration can be utilized as antifungal agent against these fungi.

Key words : Antifungal activity, Antifungal agent, Growth inhibition, N-Bromonicotinamide (NBN)

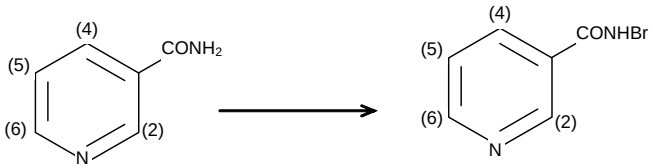
N-Bromo compounds have been used as versatile reagents in kinetic studies and organic synthesis. This compound offers many advantages like easy method of synthesis, low cost, easy handling, low toxicity and mild nature with appreciable stability (Pushpalatha and Vivekanandan, 2007). The antimicrobial activities of N-Bromo related work was carried out by Rittich *et al*. (1992), Sh.El-Sharief *et al*. (2001), Aytemir *et al*. (2003), Hida *et al*. (2005), Fatima *et al*. (2007) and Indira and Abubacker (2008). The synthesis and antimicrobial activities of similar compounds have been carried out by Zelenak *et al*. (2002), Turan-Zitonni *et al*. (2005), De La Fuente *et al*. (2006), Tao Zhao and Gang Sun (2006) and Patel *et al*. (2007).

The present work deals with testing the N-Bromonicotinamide for its antifungal activity against *Aspergillus restrictus, Candida albicans, Cladosporium herbarum, Fusarium oxysporum, Penicillium chrysogenum* and *Rhizoctonia solani*.

MATERIALS AND METHODS

Synthesis and characterisation of N-Bromonicotinamide:

N-Bromonicotinamide (m.p. 210^0 C) was prepared by the standard method described by Hauser and Renfrow (1923). Ten gram of nicotinamide was added to 150 ml of an ice-cold solution of sodium hypobromite, freshly prepared from 14.4 g (0.09 mol) of bromine, and 9.0 g (0.23 mol) of sodium hydroxide. After shaking for ten minutes, the mixture was filtered rapidly with suction into a cold solution of 9 ml of glacial acetic acid and 25 ml of iced-water. The bromomide which precipitated was filtered off, washed and recrystallized from ethanol (yield 70%).



The melting point was found to be 210^0 C with molecular formula as $C_6H_5ON_2Br$. The NBN was found to be soluble in water, acetic acid, sparingly soluble in ethanol, but insoluble in CCl_4, CH_2Cl_2 and dioxane. The stock solution of NBN was prepared in 50% acetic acid and water mixture and kept in amber coloured bottle (to prevent interaction with light). It showed no appreciable change in concentration and appearance over a period of one month indicating a pair degree of stability. The stock solution was used for screening antifungal activity.

Fungal cultures:

Aspergillus restrictus NCBT-131, *Candida albicans* NCBT-140, *Cladosporium herbarum* NCBT-145, *Fusarium oxysporum* NCBT-156, *Penicillium chrysogenum* NCBT-181 and *Rhizoctonia solani* NCBT-194 cultures maintained in immobilized condition in the Department of Botany, Microbiology Laboratory, National College were used in this work.

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