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Solvent free reaction under microwave: Eco-friendly MCR synthesis of new mono5-imino-5H-chromeno[3,4-c]pyridin-4-yl derivatives

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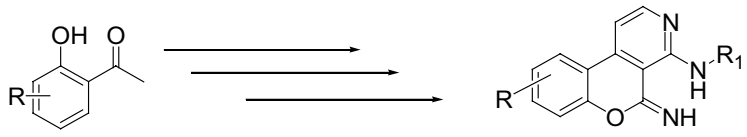
HIGHLIGHTS

Using a microwave-assisted process, we created a novel, effective technique to synthesise poly-substituted chromenopyridines with high yields. Under simple conditions, the intermediate was made from hydroxyacetophenones and malononitrile, and spectral studies were used to characterise each molecule. These substances exhibited strong antifungal action against the potentially hazardous yet biotechnologically relevant fungus *Aspergillus niger*. The potential of chromenopyridines as environmentally friendly medicinal and antifungal medicines is highlighted by their capacity to target microorganisms and interfere with metabolic pathways.



R = H, OH

96%

Board substrate scope	Excellent yield
MCRs reactions	Mild reaction conditions
Environmentally friendly synthesis	Easy operation and purification

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ABSTRACT

We developed an efficient synthetic strategy for generating a new class of poly-substituted chromenopyridines. This strategy involves the reaction of a primary amine with an intermediate enamine–imino–chromene molecule under microwave irradiation, resulting in excellent yields. The intermediate was initially obtained by reacting hydroxyacetophenones with malononitrile under basic conditions to optimise the base and protocol for high yields. All compounds were characterised using spectral analyses. The evaluation of their antifungal efficacy against *Aspergillus niger* revealed strong potential. This strain, commonly found in soil and plant matter, is used in biotechnology for enzyme and citric acid production but poses a risk due to mycotoxins like ochratoxins, which cause nephrotoxic effects and immunosuppression. *A. niger* can also cause opportunistic infections, such as aspergillosis. The synthesised compounds showed promising efficacy against this strain, highlighting their potential to prevent fungal contamination and associated health risks. Chromenopyridines, due to their ability to interact with biological targets through hydrogen bonds, their polarity, molecular planarity, and their ability to disrupt cell membranes or essential metabolic pathways of microorganisms, are particularly effective against several pathogenic strains. This confirms their potential for the development of new, environmentally friendly therapeutic and antifungal agents.

Keywords: Hydroxyacetophenone, RMCs, Chromenons, Acidic methylene