

New phosphorus-nitrogen compounds: synthesis, spectroscopic characterization and fungicide studies

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The phosphorus-nitrogen compounds, such as phosphoramides and thiophosphoramides were studied in viewpoint of their agrochemical delivery [1-4]. In the present work, new phosphorus-nitrogen compounds were synthesized and used for the study of antifungal properties. The compounds, including (R)-[(2,3-F₂)C₆H₃C(O)NH]P(O)[NHCH(CH₃)C₆H₅]₂ (1), (S)-[(2,3-F₂)C₆H₃C(O)NH]P(O)[NHCH(CH₃)C₆H₅]₂ (2), and P[S][NHCH₂C₆H₄-4-F]₃ (3) were used in this study. Characterization was done by CHN analysis, Mass, IR and NMR spectroscopy. The ³¹P signals are revealed at 4.01 and 4.10 ppm for the phosphoramides 1 and 2, respectively and at 65.40 ppm for the thiophosphoramide 3. In the ¹H NMR experiment, the broad signals at 9.42 ppm for 1 and 9.26 ppm for 2 associate to the N_{CP}—H unit (N_{CP} is the nitrogen atom of the C(O)NHP(O) segment), and the two other N—H protons appear as pseudo triplets at 4.88 and 5.06 ppm for 1 and 4.91 and 5.06 ppm for 2. For compound 3, the NH signal appears as a multiplet at 4.82 ppm. The ¹⁹F signals of compounds 1 and 2 are revealed as doublets at -138.52 and -140.26 ppm for 1 and -138.51 and -140.26 ppm for 2. For 3, the fluorine signal appears at -116.73 ppm. The antifungal properties of these compounds against phytopathogenic fungi such as *Rhizoctonia solani* and *Fusarium culmorum* were studied, which showed their effectiveness against both fungi.

Keywords: phosphorus-nitrogen compounds, NMR spectroscopy, antifungal properties, phytopathogenic fungi.

References

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