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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, 2, 3, 4]. In the presence work, new phosphorus-nitrogen compounds were synthesized and used for the study of antifungal properties. The compounds, including (R)-[(2,3-F_2)C_6H_3C(O)NH]P(O)[NHCH(CH_3)C_6H_5]$_2$ (1), (S)-[(2,3-F_2)C_6H_3C(O)NH]P(O)[NHCH(CH_3)C_6H_5]$_2$ (2), and P[S][$NHCH_2C_6H_4$-4-F]$_3$ (3) were used in this study. Characterization was done by CHN analysis, Mass, IR and NMR spectroscopy. The ^{31}P 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 ^{1}H 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 ^{19}F 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.

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