

Improving the Digestibility of Agro-Industrial Co-Products by Treatment with Isolated Fungi in the Meknes-Morocco Region

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Abstract : country, such as Morocco, generates a high quantity of agricultural and food industry residues. A large portion of these residues is disposed of by burning or landfilling. The valorization of this waste biomass as feed is an interesting alternative because it is therefore considered among the best sources of cheap carbohydrates. However, its nutritional yield without any pre-treatment is very low because lignin protects cellulose, the carbohydrate used as a source of energy by ruminants. Fungal treatment is an environmentally friendly, easy and inexpensive method. This study investigated the treatment of wheat straw (WS), cedar sawdust (CS) and olive pomace (OP) with fungi selected according to the source of Carbon for improving its digestibility. Two were selected in a culture medium in which cellulose was the only source of Carbon: *Cosmospora Viridescens* (C.vir) and *Penicillium crustosum* (P.crus), two were selected in a culture medium in which lignin is the only source of Carbon: *Fusarium oxysporum* (F.oxy) and *Fusarium sp.* (F. Sp), and two in a culture medium where cellulose and lignin are the two sources of Carbon at the same time: *Fusarium solani* (F. solani) and *Penicillium chrysogenum* (P.chryso). P.chryso degraded more CS cellulose. It is very important to notice that the delignification by F. Solani reached 70% after 12 weeks of treatment of wheat straw. Ligninase enzymatic was detected in F.solani, F.sp, F.oxysporum, which made it possible to delignify the treated substrates. Delignification by C.vir is negligible in all three substrates after 12 weeks of treatment. P.crus and P.chryso degraded the lignin very slightly in WC (it did not exceed 12% after 12 weeks of treatment) but in OP this delignification is slight reaching 25% and 13% for P.chryso and P.crus successively. P.chryso allowed 30% degradation of lignin from 4 weeks of treatment. The degradation of the lignin was able to reach the maximum within 8 weeks of treatment for most of the fungi except F. solani who continued the treatment after this period. Digestibility variation (IVTD.variation) is highly very significant from fungus to fungus, duration to time, substrate to substrate and its interactions ($P < 0.001$). indeed, all the fungi increased digestibility after 12 weeks of treatment with a difference in the degree of this increase. F.solani and F.oxy increased digestibility more than the others. this digestibility exceeded 50% in CS and O.P but did not exceed 20% for WS after treatment with F.oxy. IVTD.Var was not exceeded 20% in W.S.cedar treated with P.chryso but reached 45% after 8 weeks of treatment in W.straw.

Keywords : lignin, cellulose, digestibility, fungi, treatment, lignocellulosic biomass

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