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Degradation of untreated and anhydrous ammonia-treated wheat straw by two strains of rumen anaerobic fungi

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Anaerobic rumen fungi have the ability to hydrolyse cellulose and xylans of hemicelluloses, but little is known about the specific role of each species in the degradation of plant tissues. The aim of this study was to compare the degradation of untreated and anhydrous ammonia-treated straw by pure cultures of *Piromyces (Piromonas) communis* (FL), a species with filamentous rhizoids, and *Caecomyces* (*Sphaeromonas*) *communis* (FG10), a species with bulbous rhizoids.

The straw was prepared as described by Grenet and Barry (1990). The fungal cultures were carried out under CO_2 in Bellco tubes in a semi-synthetic medium in which the plant fragments were the sole energy source (Bernalier *et al*, 1991). The tubes for scanning electron microscope (SEM) observation contained small fragments of wheat straw and those for the measurement of DM disappearance 100 mg wheat straw. Incubation times were 16, 24, 48, 72, 96 and 144 h at 39°C.

In cultures of *P communis* after 16 h of incubation, the phloem and the parenchyma were slightly degraded and rhizoids were visible on the surface of the plant fragments. After 24 h the mass of rhizoids on the surface of the plant fragments was so large that it was difficult to observe the underlying tissues. At this stage there was little change in the degradation of the parenchyma. After 48 h the inner parenchyma began to come away from the stem and zoospores were observed on the plant fragments. After 72 h the inner parenchyma had completely separated from the stem. *P communis* degraded 15% of the untreated and 23% of the treated straw.

Sporocysts were attached to the sclerenchyma of wheat straw fragments incubated for 48 h in pure cultures of *C communis* but there was little degradation. Likewise, after 72 h large numbers of sporocysts were observed but no clear degradation. After 96 h the sporocysts had also developed on the vascular bundles but no degradation was observed. The fungi were attached to lignified tissues. Only 7% of the untreated and 5% of the treated straw was degraded.

In conclusion, the ammonia treatment improved the degradation of the straw by *P communis* but not with *C communis*. The greater ability of *P communis* in degrading the straw could be due to the presence of filamentous rhizoids, which are more effective than bulbous rhizoids at penetrating some types of plant tissues. However, the 2 fungi could also have different culture requirements.

Bernalier A, Fonty G, Gouet P (1991) *Anim Feed Sci Technol* 32, 131-136

Grenet E, Barry P (1990) *Reprod Nutr Dev* 30, 533-540