

Development of fungi in hays of white and black oats under two cutting heights

L. C. Souza¹, O. D. F. Dildey², C. C. Meinerz², E.P.M. Alfonso², M. A. Neres², T. J. Pasquetti¹

¹State University of Maringá, Department of Animal Science, Maringá, Paraná, Brazil. ²Western Paraná State University, Center for Agricultural Sciences, Marechal Cândido Rondon, Paraná, Brazil, Email: leilics@hotmail.com

Introduction The oat is a winter forage with high nutritional value, which can be used as pasture or conserved forage, in the hay or silage making. The management adopted for the production of hay, associated with the storage conditions interferes in the quality and sanity of hay, as well as losses in the process (Domingues, 2009). During storage, the population of fungi such as *Fusarium* and *Cladosporium* is reduced. On the other hand, the typical epiphytic genres, such as *Aspergillus* and *Penicillium*, increases (Hlodversson and Kaspersson (1986). The objective of this research was to evaluate the occurrence of fungi in white and black oat before cutting and in the hay obtained under two cutting heights.

Materials and Methods The experiment was conducted in Marechal Cândido Rondon, PR (24°33'40"S, 54° 04 '12"W). The seeding rates were 70 and 60 kg/ha for black oat (*Avena strigosa*) and white (*Avena sativa*) oat, respectively, using precision seeder attached to the tractor in lines spaced 0.175 m. The experimental design was a randomized block in a 2x2x3 factorial design, with two oats (*Avena sativa* and *Avena sativa*), two cutting heights (10 and 20 cm) and three assessment periods (before cutting, at the haymaking and after 30 days storage), with six replications. After sampling, the material was processed with the aid of scissors for particle size reduction. Fungi were isolated by induction of growth in BDA culture media (200 g potato, 20 g dextrose, 15 g agar and 1000 mL of distilled water), by induced sporulation. Identification of fungi was performed using specific identification keys (Samson et al., 1995). The data were transformed in logarithm (Log) and subjected to analysis of variance and means were compared by Tukey test at 5% probability.

Results and Discussion For *Aspergillus*, *Penicillium* and total counts of fungi there was no significant effect of the evaluation period, cutting height and of the interaction evaluation period x time. Higher counts of *Aspergillus* were observed after storage, in which the 10 cm cutting height resulted in higher development of this fungus (Figure 1). This result may be related to the higher proximity to the ground, resulting in higher soil contact with hay. The *Aspergillus* can serve as biological indicators of storage conditions, and their quantification in conserved forage is of fundamental importance because it represents a potential mycotoxins producer (Moser, 1995), occurring more frequently in hot and humid environments. The population of *Cladosporium* was not influenced by treatments, with an average of 1×10^2 CFU/g. According to Nascimento et al. (2000), fungi *Cladosporium* tend to disappear during the storage period. For *Fusarium* and *Rizophus* population, it was observed significant effects ($P < 0.05$) of evaluation period, of oats species and the interaction (oats x assessment periods). Higher counts of these fungi were observed after hay storage. However the white oat favored population increase of *Rizophus* at the time of baling. The same occurred for oats after storage (Figure 2).

Conclusion The storage of white and black oat hay increased *Aspergillus* and *Penicillium* population.

References

- Domingues, J.L. 2009. Uso de volumosos conservados na alimentação de equinos. *Rev. Bras. Zootecn.*, 38:259-269.
- Hlodversson, R., Kaspersson, A. 1986. Nutrient losses during deterioration of hay in relation to changes in biochemical composition and microbial growth. *Anim. Feed Sci. Technol.* 15:149-165.
- Moser, L.E. 1995. Post-harvest physiological changes in forage plants. In: Post-harvest physiology and preservation of forages. Moore, K.J., Kral, D.M., Viney, M.K. (eds). American Society of Agronomy Inc., Madison, Wisconsin, 1-19.
- Nascimento, J. M.; Costa, C.; Silveira, A.C. 2000. Influência do método de fenação e tempo de armazenamento sobre a composição bromatológica e ocorrência de fungos no feno de Alfafa (*Medicago sativa*, L. cv. Flórida 77). *Rev. Bras. Zootecn.* 29:669-677.
- Reis, R.A.; Panizzi, R.C.; Rosa, B. 1997. Efeito da amonização sobre a ocorrência de fungos, composição química e digestibilidade *in vitro* de fenos de grama seda (*Cynodon dactylon* (L.) Pers). *Rev. Bras. Zootecn.* 26:454-460.
- Samson, R.A.; Hoekstra, E.S.; Frisvad, J.C.; Filtenbor G.O. 1995. Introduction to Food-Borne Fungi. Baarn: CBS, 322p.

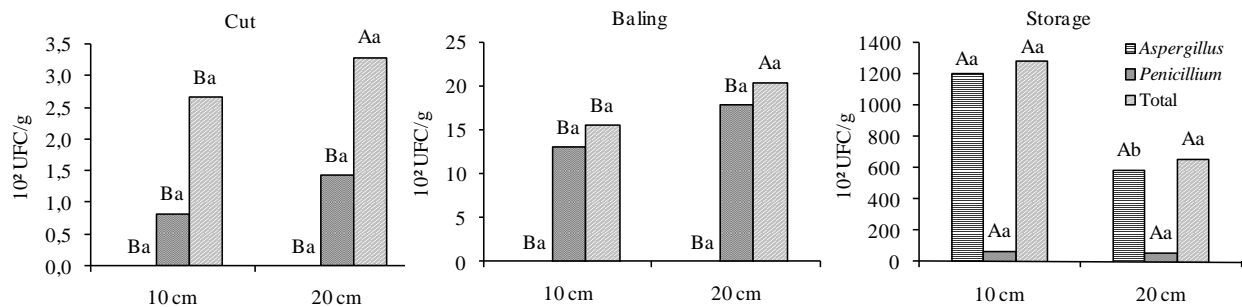


Figure 1. Occurrence of fungi *Aspergillus*, *Penicillium* and total counts, in the black and white oat hay under two cutting heights, at the time of cutting, baling and after the 30 days of storage. (Bars followed by the same uppercase letter for each fungi, and lowercase for each evaluation period do not differ by Tukey test at 5% probability).

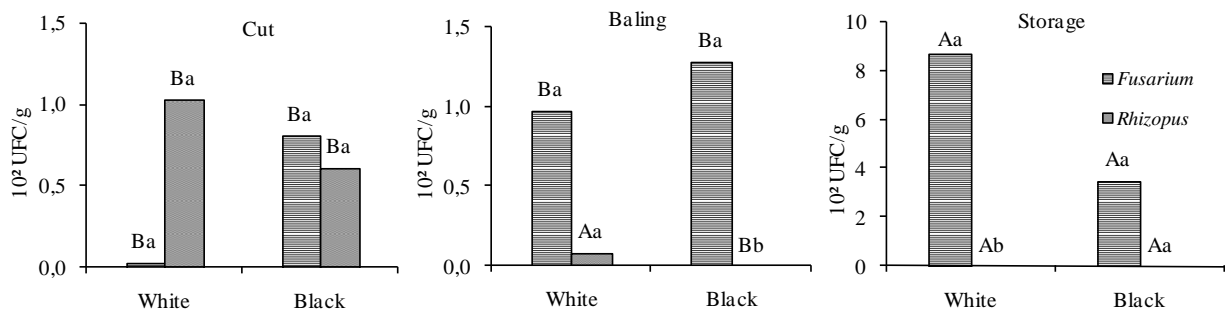


Figure 2. Occurrence of fungi *Fusarium* and *Rizophus*, in the black and white oat hay at the time of cutting, baling and after the 30 days of storage. (For each fungi, bars followed by the same uppercase letter between the periods of assessment and lowercase between the oats specie did not differ by Tukey test at 5% probability).