SUCCESSION OF MYCOFLORA ON FINISHED LEATHERS DURING STORAGE

O.P. SHARMA & K.D. SHARMA

Agra College, Agra—282002

(*Received* 10 *October* 1977, *revised* 17 *November* 1978)

The succession of mycoflora on ten important types of variously tanned finished leathers has been studied in storage. A number of fungi responsible for its deterioration have been recorded. High number of species was obtained in the samples stored at 90%RH at 28°C in comparison to leathers stored in laboratory conditions(40—60% RH and 28°C). Some interesting fungi, namely, A. *flavus* (Black sclerotial isolate), A. sydowi var. 2, *P citrinum*, *P. simplicissimum* and *P. purpurogenum* str. 2 were recorded on leathers for the first time as chrome loving fungi. The moisture content of leather samples stored at 90% RH was found to increase considerably after 60 days.

The biodeterioration of leather and leather goods includes undesirable and aggressive activities of mycoorganisms during leather manufacture, finishing, storage and in use[1]. The most common spoilages are formation of coloured inbleachable spots, mildewing and perforation due to degradation of leather proteins and loss in durability. The leather and leather goods stored in warehouses and showrooms frequently become mouldy and spoilage occurs to a considerable extent.

It was, therefore, thought desirable to investigate various types of leather degrading fungi, their succession and ecological conditions which play an important role in the development of these organisms on such products.

The different leather samples, i.e., chrome tanned upper (cow), chrome tanned belting (cow), split (buff), zug grain (cow), chrome retan (cow), semichrome, chamois (oil tanned), EI tanned, vegetable tanned, upper and sole leathers were collected from the Government Leather Institute, Nunihai and other tanneries of Agra and Kanpur.

These leathers were stored at 90% RH (maintained in large size desiccator[2]) in open petri dishes. The samples were left exposed to air and dust for three days to get them charged with micro-organisms in open place prior to storage. The control set was also maintained at laboratory conditions (40—60%, RH). The temperature was maintained at 28—30°C for both values of RH.

The samples were studied for development of fungi and change in moisture content regularly at 30, 60 and 90 days intervals. Samples were observed visually for fungal growth and the moisture content was determined by oven drying method. The fungi were isolated by direct picking up of spores of individual fungus from leather surface and dilution plate method[3]. The cultures so obtained were purified, maintained on Czapeck's dox agar medium and got confirmed from C.M.I., Kew, England.

In all, 33 fungi were isolated. Out of these fungal species 1. *Penicillium citrinum*, 2. *P. simplicissimum*, 3. *P. variabile*, 4. *P. expansum*, 5. *P. fellutanum*, 6. *P. cyaneum*, 7. *Aspergillus awamorii*, 8. *A. flavus* (black sclerotial isolate), 9. *A. luchuensis*, 10. *Alternaria alternata*, 11. *Cephalosporium* sp and 12. *Curvularia lunata* have been recorded for the first time on finished leathers. The rest of the species were : 13. *A. fumigatus*, 14. *A. terreus*, 15. *A. sulphureus*, 16. *A. nidulans*, 17. *A. tamarii*, 18. *A. sydowii*, 19. *A. sydowii* isolate 2, 20. *A. japonicus*, 21. *A. chevalieri*, 22. *A. amstelodami*, 23. *A. niger*, 24. *A. flavus*, 25. *P. funiculosum*, 26. *P. purpurogenum*, 27. *P. purpurogenum* isolate 2, 28. *P. oxalicum*, 29. *Paecilomyces variotii*, 30. *Drechslera papendorfii*, 31. *Chaetomium* sp, 32. *Trichoderma viride* and 33. *Mucor* sp.

The maximum number of species was found on vegetable upper, sole, semichrome, zug grain, chrome upper, chamois, EI tanned and chrome retan leathers. The number of fungi were relatively low on belting and split leathers.

The observations clearly indicated that fungi, i.e., 23, 24, 7, 8, 13, 14, 17, 16, 18, 1, 6, 25, 26 and 29 (names given above) were most persistent types and grew on all leather types throughout the duration of storage. Other species were found common at 30, 60 and 90 days intervals except a few species, i.e., 19, 21, 11, 32 and 33 (names given above) which disappeared after the end of the storage period. The number of fungal species was higher when leathers were stored at 90% RH than the samples stored under

laboratory conditions (40—60% RH). The total number of fungi was 33, 33 and 28 after 30, 60 and 90 days of storage respectively, at 90% RH whereas, it was only 16, 17 and 15 after the same duration under laboratory conditions.

It was interesting to note the presence of some specific fungal species which are termed here as *chrome loving fungi* on the chrome tanned leather samples. These were *A. flavus* (black scl.) and *A. sydowii* isolate 2 on full chrome upper, *P. citrinum*, *P. simplicissimum* and *P. purpurogenum* isolate 2 on full chrome upper, belting, split, zug grain and EI tanned leathers. They showed less growth on vegetable tanned leather surfaces while profuse growth was exhibited on chrome tanned samples.

The results on the percentage leather moisture in storage reveal that initial moisture content of different leather types were low, i.e., chrome tanned upper 11.5%, split 6.77%, belting 9.09%, zug grain 10.0%, chrome retan 8.0%. The semichrome, chamois, EI tanned, vegetable upper and sole leathers had 10.0, 6.2, 8.57, 15.25 and 18.0 per cent moisture respectively. Beyond 60 days of storage the moisture content of these ten types of leather were raised to 20.89, 17.5, 18.0, 23.27, 20.0, 22.0, 15.6, 23.0, 26.0 and 32.57 per cent respectively, at 90% RH. These observations clearly indicate that leathers possess high capacity of absorbing water from its surrounding air and are much liable to fungal attack at high moisture level. Hence high moisture content favours the germination of spores, multiplication and infestation of micro-fungi. The dominant role is played by the persistent types of storage micro-organisms, but their number does not vary much.

The authors are grateful to the Principal, Agra College, Agra for facilities, the Director, CMI, Kew, England for identification of fungi and CSIR, New Delhi for financial assistance.

REFERENCES

1. ORLITA, A., "Biodeterioration of materials" (Elsevier Pub. Co. Ltd., New York), 1968, pp. 297-300.

2. WILSON, R.F., *Ind. and Eng. Chem.* **13** (1921), 326-31.

3. WAKSMAN, S.A., 'Principles of soil microbiology' (The Williams and Wilkins Co., Baltimore) 1932.