NOTE

WHOLE WHEAT CAKES AS A CULTURE MEDIUM FOR THE POWDER-POST BEETLE, *HETEROBOSTRYCHUS AEQUALIS* (BOSTRYCHIDAE)

Y.F. Ho & L.G. Kirton

Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur, Malaysia

Heterobostrychus aequalis is a serious pest of many light hardwoods such as jelutong, ramin and sepetir (Menon 1957). At the Forest Research Institute Malaysia, rearing *H. aequalis* on rubberwood has not been found to be consistently effective as sometimes very few progeny were obtained or development periods were prolonged. It was also difficult to retrieve larvae and adults from the wood without damaging them. An alternative technique using whole wheat flour as a culture medium is therefore described here. It enables the production of large numbers of insects for experimental purposes.

This study was initiated based on the findings of earlier workers. Ayappa (1961) introduced whole wheat flour as a culture medium for *Sinoxylon crassum* and *S. anale* (Bostrychidae) in India. The diet took the form of a baked rolled cake of 'atta' (whole wheat flour) enriched with yeast. More recently, Suzuki (1983a, b) used buckwheat flour cakes for culturing *Lyctus brunneus* and *Dinoderus minutus*. Ito and Hirose (1980), and Iwata and Nishimoto (1982, 1983) used starch or whole wheat flour enriched with brewer's yeast for the culture of *L. brunneus*.

Commercially produced whole wheat flakes were ground into fine flour and turned into a dough using water. The dough was compacted and shaped into several cylindrical blocks of about 4 *cm* diameter and 9 *cm* long. These were then wrapped with tracing paper. In addition, some dough was placed on a baking tray and levelled. Holes of approximately 0.5 *cm* diameter and 3 *cm* deep were made in the dough by means of a glass rod, with approximately 1 *cm* intervals between each hole. Both the cylindrical blocks and tray of dough were dried in an oven at 60°*C* to form 'cakes'. The cylindrical blocks of dough dried in about one week whilst dough in the trays required about three weeks. Thorough drying was essential to prevent attack by fungi.

Each cylindrical cake was placed on a piece of filter paper that fitted closely into the base of a jam jar approximately 6 *cm* in diameter and 12.5 *cm* high. A pair of beetles were introduced onto the cake. The jar was lightly capped so as to permit ventilation. It was then held in a chamber at about 27°*C* and approximately 80% R.H. Contamination of the culture by mites was minimized by standing the jam jars in trays filled with soapy water.

After three months, practically the whole cake was reduced to powder. The

newly emerged beetles were then introduced to new cylindrical cakes. The numerous larvae found in the powder were sieved out and a larva was introduced into each hole on the cakes in trays. A proportion of these larvae developed into adult beetles.

Beetles from infested wood in the field were added to the laboratory cultures frequently so as to prevent possible bad effects of inbreeding. Precautions had to be taken not to introduce mites which could be present on the adult beetles, as they had been observed to feed on eggs.

Filter paper served as a good foothold for parent beetles in the bottles. Without it, beetles were often unable to reach the cakes. Tissue paper tends to fold and this obstructs the beetles.

Five pairs of beetles were introduced to an approximately 100 *g* cylindrical whole wheat cake. This was replicated five times and repeated with approximately 115 *g* rubberwood blocks (dimensions 11 × 5 × 2.5 *cm*). The latter was obtained from 20-*y*-old rubber trees which were no longer being tapped.

The effectiveness of the whole wheat cakes as compared to rubberwood is shown in Table 1.

Table 1. Yield of adult *H. aequalis* from whole wheat cakes and rubberwood

Culture medium	No. of adult offsprings after 3 *mths*	
	Mean	Range
Whole wheat	46.2	19-67
Rubberwood	10.0	0-27

Whole wheat cakes yielded about five times more progeny per unit weight compared with rubberwood. The brittleness of whole wheat cakes at the end of the development period made retrieval of larvae and adult beetles much easier than in rubberwood. Hence whole wheat cakes are a good substitute for rubberwood as a culture medium for *Heterobostrychus aequalis.*

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MENON, K.D. 1957. Susceptibility of common species of Malayan timbers to powder-post beetle attack. *Malayan Forester* 20 : 19 - 23.

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SUZUKI, K. 1983b. A medium for mass culturing a bamboo boring beetle *Dinoderus minutus* Fabr. Document No.: IRG/WP 1182, 4pp. (Paper presented at the 14th Annual Meeting of the International Research Group on Wood Preservation, Australia).

BOOK REVIEW

MIKAEL GRUT, JOHN A. GRAY & NICOLAS EGLI. 1991. ***Forest Pricing and Concesssion Policies. Managing the High Forest of West and Central Africa.*** World Bank Technical Paper Number 143. Africa Technical Department Series. ISSN 0253-7494. 77pp.

The World Bank has increasingly been involved in financing forest conservation and management in Africa. In 1988, the division "Africa, Technical, Agriculture" (AFTAG) undertook a study of the controversial subject of forest revenue and concession system to produce a technical paper setting out issues, current practices, options, recommendations and alternatives, both for use by Bank staff involved in lending to the African countries, and by the countries themselves in revising their revenues and concession policies. The author, Mikael Grut, developed the framework for the study, identified the key issues, planned the field work, developed the priority recommendations, and supervised the project throughout. Nicholas Egli carried out and wrote the case studies. John Gray was primarily responsible for analysis of the issues and options and for writing the major part of the report.

The 23 issues and options in forest pricing and concession policies are grouped into five categories. The low forest revenues issues concern low forest fees, lack of inflation adjustment, and low collection rate. The forest management, silviculture and forest utilization issues deal with fee differentiation by species, size and accessibility to correct wasteful logging. The forest industry issues consider incentives for domestic processing and for efficiency, charges on processing products, log export restrictions and export taxes. The concession management and tenure issues contemplate concession fees, concession size and length, management incentives and alternatives. Finally, the sustainable development issues deliberate biological and financial sustainability.

A draft of study was widely circulated within the Bank (some twenty persons) and to persons with international experiences in environment, conservation and forestry (some two dozen persons). Therefore, the issues and options are most likely from the World Bank point of view. This book is useful to forestry agencies in developing countries to deal with the World Bank. Certainly, financial assistance will be easier to obtain from the Bank if these issues are addressed and recommendations followed.

This book is also useful to those working for the tropical woods export trade. If the recommendations from this book are carried out, the golden age of cheap African wood may soon be over. Business may not be usual. Forest fees will be higher. Log scaling will be done by government. Stumpage fee will be differentiated by species, size and by accessibility. Unreported logs and illegal logging, under-measurement of processed products, under-invoicing and under-grading will be stopped. Concession size will be smaller and concession tenure will be shorter.

The book fails to address the problems of recommendation implementation, mainly the lack of qualified foresters. It may be most rational to the authors that the forestry agencies should do the inventories, should decide what trees to remove in each cut, and should build logging roads and inspect cutting. It may be most desirable for the authors to replace logging concessions by forest management concentrations. But where can the developing countries find the manpower to do it?

The book is full of rhetoric but lacks in supporting concrete data. The 77-page book contains not even a single graph or table. The case study was incomplete. Total area, population size and density are given for Central African Republic and Congo, but not for the other countries. The total forest areas are expressed in units of square kilometer for Central Africa Republic, but in units of million hectare elsewhere in the case study.

In general, readers of this book will find it interesting how the African governments are helpless in dealing with the profit-driven loggers. Yet it is questionable whether more government controls and stronger regulation, envisioned by the western standard, are actually good for the people and the forests in Africa. As in a zero-sum game, rich governments make people poor, wastes in the forest enrich communities.

Fan H. Kung
Southern Illinois University

ANNOUNCEMENTS

INTERNATIONAL MYCOLOGICAL INSTITUTE TRAINING COURSES

The International Mycological Institute (IMI) is one of the four scientific institutes of CAB International. IMI is the leading world centre for mycology. With a staff of over 60, the Institute provides information, culture collection, identification, advisory and training services for microfungi and bacteria of

importance to agriculture, the environment, public health and other aspects of applied biology.
The two short courses quoted here are taken from the Course Programme 1993 scheduled for the later part of the year :

1) Identification of *Fusarium* Species

Date : October 18 - 22, 1993
Course Fee : £ 450

The course will cover modern methods of culture and identification to species level and will provide a practical opportunity to work with a range of *Fusarium* cultures. The workshop will include species of significance in plant pathology, mycotoxin production, industrial and medical mycology, from both temperate and tropical regions.

2) Biodetrioration of Manufactured and Synthetic Products - Prevention, Assessment and Testing

Date : December 8 - 10, 1993
Course Fee : £ 320

This course will explore the microbial problems which may arise with synthetic materials and products during manufacture, use and storage. Materials to be covered include plastics, electronic equipment, adhesives, textiles, surface coatings, fuels, lubricants, coolants and pharmaceuticals. Lectures and demonstrations will also cover challenge testing and aspects of maintenance and management of collections of test organisms.

For further information, contact:

Miss Janet Pryse
International Mycological Institute
Bakeham Lane, Egham
Surrey TW20 9TY, United Kingdom
Tel: 0784 470111 Fax: 0784 470909

IUFRO SEOUL CONFERENCE ON ADVANCEMENT IN FOREST INVENTORY AND FOREST MANAGEMENT SCIENCES

Date : September 20 - 25, 1993
Venue : Conference Hall, Seoul National University, Seoul, South Korea

This conference will focus on new advances in forest inventory and forest management sciences which have been developed and applied in various forest areas and countries, providing a desirable prospect for the sustainable forest management strategies in the 21st century. It will promote close cooperation between members of IUFRO Subject Groups S4.02, S4.04 and S4.11.

The major goals of the conference are to:

* discuss problems on sustainable forest management
* recommend proper alternatives for sustainable forest management in the 21st century
* discuss forest land use strategies in various countries
* discuss inventory and monitoring techniques and applications

For further information, contact:

Professor O-Bok Kwon
Forestry Research Institute
207 Chongnyangni-dong
Tongdaemun-gu
Seoul 130-012, South Korea
Tel : 82-2-961-2531
Fax : 82-2-967-5101

NINTH ANNUAL WORKSHOP ON DESIGN, OPERATION AND MAINTENANCE OF CIRCULAR AND BANDSAWS

Date : March 21-22, 1994
Venue : The Red Lion Hotel, Lloyd Center
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USA

For further information, contact :
Dr. R. Szymani
Wood Machining Institute
P.O. Box 476
Berkeley, California 94701
USA
Tel : (510) 943-5240
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The following people have reviewed the manuscripts for JTFS Volume 5. Without their painstaking work, it would nearly be impossible to maintain the quality of a professional journal. If I have omitted anyone from the list, I sincerely apologise. With thanks to these people who cared.

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JOURNAL OF TROPICAL FOREST SCIENCE

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Language: English is the official language of the journal.

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BAWA, K.S. & OPLER, P.A. 1975. Dioecism in tropical forest trees. *Evolution* 29: 167 - 179.

KIRA, T. 1978. Community architecture and organic matter dynamics in tropical forest of southeast Asia with special reference to Pasoh Forest, West Malaysia. Pp. 561-590 in Tomlinson, P.B. & Zimmermann, M.H. (Eds.) *Proceedings of the Fourth Cabot Symposium, "Tropical Trees as Living Systems"*. Harvard Forest, Petersham, Massachusetts. April 26-30, 1976. Cambridge University Press, Cambridge, Massachusetts.

LONGMAN, K.A. & JENIK, J. 1974. *Tropical forest and its environment.* Longmans, London. 196 pp.

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