Simple methods of harvesting, drying, and cleaning could also be placed in better perspective by progressing logically from these through to more sophisticated methods, rather than approaching them from an advanced technological viewpoint. The author has recognized the importance of measures to control seed quality (both physical and genetic) and of coupling these with effective extension aimed at seed users, but this topic deserves more thorough coverage than the brief notes included. Quality control should also be an integral part of even a developing seed industry because good seed is now readily available from other tropical countries.

The reviews of literature in this book have obviously been carefully compiled and updated, although occasional slight blemishes are apparent. A few references (e.g., Alárcon *et al.* (1969) on p. 42 and Poulsen (1969) on p. 90) have been omitted from the appropriate bibliographies and some inaccurate cross-references occur (e.g., the direction on p. 98 to the seed dryer in plate 5 is not valid in this edition). However, to avoid the risk of placing the wrong emphasis on published facts, the chapters on harvesting and processing (ch. 5) and on the seeding characteristics of various species (chs 7 and 8) should include more of the wealth of unwritten practical information. In future, consideration could be given to inviting specialist contributors, in close contact with particular aspects of the commercial situation, to write parts of these chapters (particularly 7 and 8 where I doubt that the full range of species can ever be covered successfully by one person).

Improvements such as the glossy cover, the use of slightly heavier paper and better type, and sharper reproduction of photographs have all contributed to a more professional appearance in this edition. Errors of typesetting are few and generally of little consequence. On the whole, a better selection of photographs has been included, though there is still room for improvement in the quality and purpose of some illustrations. It is a pity, however, that these have been grouped at the end, rather than being appropriately placed through the text for greater impact, particularly as the latter arrangement was used in an earlier book in this FAO series. It is also unfortunate that, despite comments by the previous reviewer, the crop of 'Siratro' in plate 25 is still upside down.

These faults, however, should not be allowed to overshadow the important fact that a rather broad field has been summarized in a concise and readable manner. This book does not set out to provide day-to-day recipes for farmers, but it will be extremely useful to advisers who can best give such recipes and will provide background information and ideas for seed producers; it will also help researchers with a necessary lead into the literature. For anyone in these groups involved in tropical pasture seed production, it should be recommended reading.

D. S. LOCH

BUNTING, E. S., PAIN, B. F., PHIPPS, R. H., WILKINSON, J. M. AND GUNN, R. E. (1978). *Forage Maize: Production and Utilization.* Agricultural Research Council, 160 Great Portland Street, London, U.K., paperback, 346 pp., price £4.50 net.

What is the relevance of a book of this title to people in a tropical or sub-tropical environment where forage maize production is negligible?

Fourteen years ago the same question could have been asked of people living in the United Kingdom, for its forage maize production at that time was only 1000 ha. There has been a thirty-six fold increase in production since that time and a successful, if modest, industry is established.

Men of vision, largely the authors of the chapters of this book, saw the need in the U.K. for feeding cattle in winter a fodder which is high in metabolizable energy. They recognised the importance of forage maize in the United States of America where it filled this role admirably and commenced studies aimed at adapting maize production to suit U.K. conditions. The fact that forage maize is now an established industry in an environment close to its ecological limit is a tribute to the resourceful-

ness and research and extension ability of those involved. It can also serve as a stimulus and a guide to those of us faced with similar problems.

The text is characterised by a pleasant blend of research findings and practical experience and is supported by some 530 references, many as late as 1977, 76 figures, 125 tables, 15 colour plates and 12 monochrome photographs.

The 14 chapters cover the history of forage maize production in Europe and various aspects of its breeding, agronomy, conservation and utilization in that environment. Those aspects likely to be of most interest to readers in the tropics and sub-tropics relate to climate, physiology, breeding, machinery, storing and handling, ensiling, nutritional value, utilization and efficiency of energy use.

The chapter on climate provides excellent coverage on the manner in which detailed, accurate climatic records can be used to "delineate the areas likely to be most suitable for forage maize production, to quantify the risks involved and to illustrate how careful site selection can minimize these risks".

Included in the discussion on physiology is an assessment of the importance of the C4 pathway and the possibility of exploiting the benefit which this pathway bestows in terms of changes in canopy architecture, particularly leaf angle.

The chapter on breeding is refreshing in that a genuine attempt is made to provide breeding objectives specific to forage maize. The usual emphasis placed on breeding for high grain yield is missing. The ideotype concept is stressed. The plant sought is to have erect leaves, high cob proliferacy, superior early growth yet be late flowering, have a high cob to whole plant ratio and, for good quality, forage of low lignin content.

Wide coverage is given to machinery and silo design and to the practical aspects of silage making. A minor deficiency as far as tropical and sub-tropical interests are concerned is the paucity of information on trench silos.

The chapters on nutritional value and utilization of maize silage by beef and dairy cattle and by dairy herd replacements do nothing but strengthen the high opinion held for maize silage as a source of high metabolizable energy. Another minor deficiency in the text is that comparisons of maize silage are invariably made with barley or temperate grass feed systems. Readers from warmer climes will have to refer to North American literature to find the maize silage/fodder sorghum silage comparisons more appropriate to their environment.

The final chapter is devoted to appraising the energy requirements of forage maize production. Once again forage maize is shown in a good light. In the U.K., maize silage production is more efficient, energy wise, than conventional forage systems; that is, those based on grassland or barley.

The book leaves the reader in no doubt that wherever intensive beef or dairy cattle production occurs and the availability of fodder high in metabolizable energy is limited for some period of the year, maize silage could well be the fodder to produce.

It is doubtful if there is a more appropriate or up to date reference for people involved in the production of forage maize. It would also be appreciated by any farmers involved in intensive cattle enterprises and by scientific workers, students, teachers and advisers.

There is little doubt that there will be a big swing to producing energy crops that can be converted to liquid fuel. Such a swing will require more widespread use of machinery which will harvest and chop whole plants.

This change in farming practice could lead to a breakdown in the general reticence to producing silage. If this occurs we could well see large scale production of forage maize. We will then have the situation where knowledge on production of the crop in the tropical and sub-tropical environment, where maize is well adapted, is aided considerably by a book written to describe production in a cool-temperate climate where maize is barely adapted.

J. HARBISON