Book review

International Atomic Energy Agency: Cereal Grain Protein Improvement. Proceedings of the Final Research Co-Ordination Meeting of the FAO-IAEA-GSF-SIDA Co-Ordinated Research Programme. Vienna, 6–10 December 1982. Vienna: International Atomic Energy Agency 1984. 388 pp., several figs. and tabs. Soft bound Austrian Sh. 760,–.

This book is based on the proceedings of the Final Research Co-ordination meeting of the FAO/IAEA/GSF/SIDA joint research programme and follows a whole series of proceedings on plant protein improvement, mainly by induced mutations. The book is split into three main sections, on mutation breeding, cross-breeding with mutants and other protein gene resources and finally genetics, cytogenetics and physiology. The general impression from reading the thirty or so papers is that an extremely large effort has been put into improving protein and lysine content of cereals without much return in terms of novel varieties which have outclassed or replaced conventional varieties. This is not to say, of course, that new, important varieties will not emerge in the future and much of the research described makes a valuable contribution to cereal research. Many of the articles in the first section on mutation breeding can be described as in the "promising" stage – and clearly need much developmental work. In an interesting article, Dr. M. Walther compared the relative advantages of mutation and cross breeding for protein improvement in barley. He concluded that mutation breeding for quantitative characters was possible but only with a great amount of effort and suggested that similar achievements were possible by cross breeding, but at a lower level of imput.

In the second section, on cross breeding with mutants, there are several papers describing the difficulties of breeding for protein improvement. Thus Dr. F. Scholz showed that while it is comparatively easy to obtain mutant lines with increased grain protein content, it is extremely difficult to obtain an improvement or even a maintenance of protein yield in these lines. Elite lines often yield erratically under adverse growing conditions and they may be more susceptible to diseases such as ear rot in maize and stripe rust in wheat. However, set against this is the promising exploitation of the high-protein trait in *Triticum dicoccoides* in raising the protein content of wheat and the in-depth work on protein improvement in maize at CIMMYT where the opaque-2 genes have been transferred to vitreous endosperm types and new lines are beginning to compare favourably with commercial varieties.

The third section contains a range of different papers emphasising the importance of support science in breeding such as genetics, physiology and molecular biology. Dr. A. Brunari and coworkers describe how different varieties of wheat have different rates and durations of nitrogen accumulation during grain development and they discuss how these traits might be combined to give high-protein genotypes. The great potential of exploiting genes present in wild relatives of wheat for improving protein content and quality (both technological and nutritional) was stressed by Dr. C. N. Law and coworkers. Finally, there is an interesting paper by Dr. P. R. Shewry and colleagues on the possible future exploitation of molecular biology to raise the lysine content of grain protein and on the search for mutants with increased levels of free lysine and threonine.

In summary, this book gives an up-to-date, detailed yet realistic survey of breeding for improved protein in cereals.

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