

# SOIL FERTILITY

## China's Centuries-Old Custom Has Disadvantages

THE subject of sewage-disposal is scarcely a fragrant one but it is unquestionably important. When it is under discussion the centuries-old practice in China of returning body waste to the soil is frequently quoted with fervent approval. But there is another and less well-known side of the picture and it is given here in this extract from an article on "Soil Fertility Maintenance Under Different Systems of Agriculture," from the *Empire Journal of Experimental Agriculture* (Vol. XIV. No. 53). The writer is DR. H. L. RICHARDSON, a New Zealander who studied at Rothamsted, and then was six years in China.

tropics, and this is undoubtedly the reason why China has the highest death-rate in the world (variously estimated at from 28 to 30 per 1,000 annually). Winfield has stated (in a lecture) that out of the total death-rate at least 8 per 1,000 are due to what he calls "faecal-borne diseases," i.e., diseases carried by night-soil used as manure. Buck doubts whether China can justifiably continue to use night-soil, unless the process can be made sanitary, and there are immense practical difficulties in the way of doing this.

The most fertile soils of China are those of the alluvial plains, where fertility maintenance depends both on the silt from irrigation or flood waters, and on the high population density that has grown up in such areas. This, in China, results in a high level of manuring. The use of night-soil as manure, and the cost of transporting it for more than a limited distance, has led to the building up of a ring of highly-fertile soils around the cities, with a corresponding degree of impoverishment of the country farther away. These, the alluvial plains and especially the land near the cities, are the regions most commonly seen by short-term visitors to China (including F. H. King), but they represent only a small fraction—about one-fifth—of the area of agricultural China as a whole. In the hilly parts of China the fertility of the soil is generally lower than on the plains; crops are poorer, and the effects of nutrient deficiencies are evident to the eye.

### "A More Balanced Picture"

This rather critical account of soil-fertility maintenance in China is given, not to belittle the achievements of Chinese farmers—for indeed they have maintained the fertility of their soils at a higher level than the practitioners of most other systems of traditional agriculture—but in the attempt to present a more balanced picture than that drawn by writers who have had little or no acquaintance with China as a whole. It is obvious to the discerning eye that most Chinese soils are nutrient-deficient; the same result has been shown by over 500 modern-type fertiliser experiments, which have given significant—and often very large—responses in over 80 per cent. of the experiments done. The nature and degree of the deficiencies vary in different regions and in different soils; on the whole, the leached soils of central and south China are more nutrient-deficient, and more responsive to fertilisers, than the unleached soils of the north. The fact that the general fertility of Chinese soils is moderate rather than high is clearly shown in the average crop yields, which for most crops are lower than those achieved in intensive modern agriculture. The average yield of wheat, for example (1929-33), was 16 bushels per acre; and of paddy rice, 67 bushels per acre according to Buck's survey or 53 bushels per acre in a more recent estimate by the National Agricultural Research Bureau.

CHINESE agriculture first began in the watershed of the Yellow River, as a valley-plain civilisation; but in the course of time it spread outwards into the hilly regions and adopted techniques, such as terracing, which made continuous agriculture possible here also. As far as reliable historical records go, systematic manuring was not adopted until fairly late in the development of traditional agriculture, at a period equivalent to Graeco-Roman times in Europe. For many centuries before the present time the methods of manuring described in Chinese agricultural literature have resembled those of to-day; the most important source of plant-food, especially of readily available nitrogen, is night soil; ashes, cattle and pig manure, composts, and green manures, as well as other local materials like oilseed cakes and crushed bones, are also employed.

This method of fertility maintenance, employed also until quite recent times in Japan, is widely known abroad, particularly from the eulogistic and charming account of F. H. King. It is good as far as it goes, but its value appears sometimes to have been overrated, and its disadvantages overlooked. The fertility of Chinese soils is, on the whole, at a moderate rather than a high level; there is a closed cycle of plant-nutrients, in which no more can be added to the soil than is taken out of it, and there are inevitable losses which are barely balanced by natural recuperation. Thus so far as plant-nutrient supply is concerned, yields cannot be raised above the present level by the existing system alone. To improve crop production appreciably it will be necessary to bring more plant-nutrients into the cycle from outside sources.

### Pollution of Soil and Water

A further and very grave disadvantage is the high death and disease rate from soil and water pollution due to the widespread use of night-soil. This aspect was neglected by F. H. King and his followers, but no one who has lived long in China can ignore it. Heiser remarked, after a lifetime of public health work in Asia, that water and soil pollution are the root causes of mortality in the



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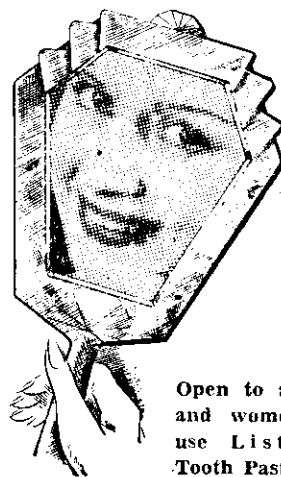
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