

How China Feeds Her Millions

The Farmer of That Country Has Learned Many Wrinkles Which Our People Know About But Fail to Apply — Enormous Wasteage of Civilized Countries is Utilized in Agriculture in the Celestial Empire Where Labor Means Nothing and Material Much.

China has always been essentially an agricultural nation. For unnumbered centuries its soil has supported a huge population, and it does so today with seemingly undiminished fertility. This is obviously because the Chinese farmer, although his methods and machinery reflect the generally unprogressive tendencies of his people, has inherited from the remotest generations a practical knowledge of the fundamentals of scientific agriculture.

If Chinese farming today seems primitive to the foreign visitor, it is principally because of its prodigal use of man power and its almost total lack of modern machinery. Farmer John Chinaman, however, is an unquestionable wizard in making two blades of grass spring up where Nature intended only one. Labor-saving appliances would increase very little, if any, the production of the arable areas, and would throw out of employment millions of farm laborers whom Chinese industry is not yet ready to absorb.

It follows, therefore, that the present needs of agriculture in the far eastern republic are not so much American plows and harrows as general agricultural engineering projects of a public nature designed to increase the cultivable area and to harness the great, untamed rivers. Improved transportation is, of course, a universal and primary necessity.

The minute and painful economies practiced everywhere in China are nowhere more visible than on the farm. Nothing is allowed to waste. The necessities of fertilization bring into use every leaf and straw, every conceivable sort of refuse, even the sewage of cities and the silt from canals and rivers.

There are certain statisticians who have estimated that the people of the United States and Europe are pouring into the seas, lakes, rivers and underground waters from 7,791,300 to 12,000,000 lbs. of nitrogen, 1,811,000 to 4,161,000 lbs. of potassium, and 77,200 to 3,067,600 lbs. of phosphorus per million of adult population annually.

"This waste," writes the late Dr. F. H. King, formerly of the United States Department of Agriculture, "we esteem one of the great achievements of our civilization. In the Far East, for more than 20 centuries, these enormous wastes have been religiously saved, and today the 400,000,000 adult population send back to their fields annually 150,000 tons of phosphorus, 176,000 tons of potassium, and 1,183,000 tons of nitrogen comprised in a gross weight exceeding 182,000,000 tons, gathered from every home, from the country villages and from the great cities.

"Man is the most extravagant accumulator of waste the world has ever known. His withering blight has fallen upon every living thing within his reach, himself not excepted; and his besom of destruction in the uncontrolled hands of a generation has swept into the sea soil fertility which only centuries of life could accumulate, and yet this fertility is the substratum of all that is living.

"It must be recognized that the phosphate deposits which we are beginning to return to our fields are but measures of fertility lost from older soils, and indices of processes still in progress. The rivers of North America are estimated to carry to the sea

more than 500 tons of phosphorus with each cubic mile of water. To such loss modern civilization is adding that of hydraulic sewage disposal through which the waste of 500,000,000 people might be more than 194,300 tons of phosphorus annually, which could not be replaced by 1,235,000 tons of rock phosphate, 75 per cent. pure.

"The Mongolian races, a population now approaching the figure named; occupying an area little more than one-half that of the United States, tilling less than 800,000 square miles of land, and much of this during 20, 30 or perhaps 40 centuries; unable to avail themselves of mineral fertilizers—could not survive and tolerate such waste."

Every morning throughout the year a fleet of sampans can be seen on the creeks and canals of the foreign settlement of Shanghai, and this is a universal practice throughout China. Starting on their rounds of distribution to the surrounding farms, freighted with night soil. This commerce amounts to thousands of tons annually, and is an industry yielding a huge return to its promoters.

A jaunt into any part of the country, at any time of the year, cannot fail to give ample evidence of the intensive practice of fertilization. The evidence is nostril, visual and attested by the luxuriance of the crops. The night soil is usually applied in liquid form, which makes it more easily and speedily "digestible" to plant life.

Droppings from animals in the streets and caravan roads are not allowed to lie long; they are whisked away energetically to some growing crop. This practice gives little encouragement to flies, a pest of which China is comparatively free; but there is, of course, an offsetting inconvenience to the general mode of all-India size utilization of waste. Without scientific precautions the use of night soil entails grave insanitation, and the distribution of bacteriological evils is excessively great, in spite of the general custom of consuming no uncooked vegetable food and drinking no unboiled water.

Much of the fuel used in China consists of plant fibers—rice, straw, millet, stems, bean stalks, twigs, pine boughs, and even the leaves of trees. Their ashes in turn become fertilizer. The forest areas, practically denuded by centuries of consumption and a public spirit indifferent to reforestation, still yield a great quantity of plant food through the ashes of shrubbery and saplings to which necessity does not allow the time for maturity.

Many hill lands are made to contribute grasses for compost material. Some of their herbageous growth is applied directly to the rice crop, being trodden laboriously into the mud between the rows of plants.

A great quantity of canal mud is applied to cultivable fields, sometimes more than 70 tons per acre. In districts where there are no canals or streams such fertilizer is imported, and with tremendous labor is composted with refuse of all kinds. Often it is dried and pulverized before application to the fields.

Many a western farmer is ignorant of the fact that leguminous plants draw nitrogen from the air and are capable of returning it to the soil, but in China this has been known and practiced as an essential to enduring fertility for centuries. A variety of

clover is sowed either just before or just after a rice crop is harvested, and allowed to grow until the next transplanting time. Then it is either turned under directly, or cut and stacked on the banks of canals or reservoirs, and made into a compost with generous applications of canal mud.

After 20 or 30 days of fermentation this mixture becomes an excellent fertilizer, capable of forcing a crop into rapid and heavy yielding growth. No Chinese farm is without its compost pits. In them are gathered coarse manures of all sorts, together with stubble, roots, garbage and any and all refuse. These materials usually are saturated with mud from the canal bottoms, and, as has been said, green clover is sometimes added, interspersed with layers of mud. When ready for use this heavy mass is moved to the fields, always by man power, in baskets suspended from carrying poles.

If the fertilizer is to be applied in dry form, a still longer and more laborious process of composting is necessary. As the time for "feeding" to the crops nears, the fermented product is carried in waterproof baskets to the farmyard, or to the

court of the farmer's house. There it is spread to dry, to be mixed with fresh soil and more ashes; it is repeatedly stirred and turned for the purpose of aeration, thus hastening the process of nitrification. Stone rollers drawn by cattle are sometimes used to assist in adequate pulverization.

The national aversion to waste is well illustrated in the use of the bricks from the kang, or sleeping platforms of houses, and of the dirt floors of dwellings as fertilizer. This practice is based on the hereditary knowledge of the Chinese that earth floors become heavily saturated with calcium nitrate. When overcharged they absorb moisture, and become sticky and wet. Chinese contractors go from house to house and village to village, purchasing this soil. The heat from the smoke flues which warm the kangs, and the fermenta-

tion and absorption of products of combustion, add elements of fertility to the bricks, and they are removed every three or four years, and broken up for immediate application to the fields, or mixed with composts. Wheat roots are often cut from the harvested straw, and used as compost material. Valuable and much-sought plant food is obtained from the bottoms of fish ponds, which are sometimes drained in the dry seasons and converted into fields.

Straw from thatched roofs, which must be renewed every four or five years, is highly prized as fertilizer. It may serve doubly—first as fuel, and then as ash.

A very laborious practice followed by the farmers in some provinces is the exchange of soil from one field to another. This frequently is done between mulberry orchards and rice fields. The Chinese farmer has found

from long experience that it is mutually beneficial to both rice and mulberry trees.

Although there is practically no dry farming in China, there is a vast system of canals, particularly in the rice-growing regions, which serve both for irrigation and as a means of transportation. The country enjoys a heavy rainfall, and a longer growing season than is common to the United States, which lies a mean distance of about 10 degrees farther north than China proper. These circumstances, combined with the system of high fertilization, make possible extensive multiple-cropping.

Two plantings of rice are grown in the southern provinces. Farther north there is usually a crop of rape, wheat, barley, beans or clover, sometimes all of them together, followed by rice. In the extreme northern provinces, wheat or barley is followed by some variety of millet, soy beans, sweet potatoes or peanuts.



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