

'Green Revolution' Has Sharply Increased Grain Yields but May Cause Problems

By ISRAEL SHENKER

Until recently the world's food experts were wondering how to drive off the specter of hunger and frustrate the predictions of Malthus, who warned in 1798 that population was outrunning food supply.

Today many experts are concerned about the specter of feast rather than famine and a single phrase—"the green revolution"—signals the new attitude and the growing vogue.

In giving the 1970 Nobel Peace Prize to Dr. Norman E. Borlaug, one of the (green) revolutionary fathers, the Nobel Prize Committee all but insured that the banner of revolution will fly even more proudly and win even more converts.

Higher Grain Yields

The green revolution is the postwar development and application, largely in the developing countries, of new high-yield cereals — wheat, rice and maize, and also sorghums, millets, potatoes and grain legumes.

The results have been dramatic, transforming one nation after another from food importer to exporter and, in the process, enriching some and disturbing the precarious tranquility of many in established customer-client and tenant-landlord relationships in the equilibrium between urban and rural areas.

In great part as a result of the application of new plant varieties, India and Pakistan have raised their wheat production 50 per cent. India, which expects to be self-sufficient in rice by 1972, had a food output 11 million tons

larger in 1969-70 than the record 89 million tons of 1964-65. Last year Pakistan began exporting rice.

The Philippines, after 65 years of dependence on rice imports, have now achieved self-sufficiency. Ceylon increased rice production a third in two years. Indonesia exports corn to Japan. Afghanistan was so impressed by the green revolution that the Government assessed the budget of each ministry to get money to launch a new wheat program.

About 60 per cent of the world's workers are in agriculture, and—if the revolution can be extended and broadened to cover other crops and other countries—hundreds of millions could shift from the land. Even before that, vast resources expended in producing food could go to other crops.

The roots of this revolution go back to nineteen-forties, when Dr. Borlaug then a member of the Rockefeller Foundation, arrived in Mexico City. He and his associates began with three varieties of wheat—Japanese "Norin" dwarfs; Gaines, a Pacific Northwest wheat that had produced enormous yields, and local Mexican wheat.

Dr. Borlaug lost his first crop to rust. But he had a few kernels of Norin dwarfs left in paper sacks, and when he planted these they took hold. "We crossed them on everything we had," he recalled later.

Eventually Dr. Borlaug used breeding materials from Minnesota, North and South Dakota, Washington, Texas, Canada, North Africa, Kenya, Australia, Italy, Brazil, Argentina and

Peru. Put together they contributed desirable color, rust resistance, good milling and baking properties, higher protein, dwarfness (to minimize top-heaviness) and high yield.

"The plants of the world have a lot of wonderful genes in them if you can just find them and combine them," Dr. Borlaug said. One of the crucial wonders was small sensitivity to light, which has allowed the planting each year of as many as three crops unaffected by the length of the day.

Sends Seeds to India

In 1963 Dr. Borlaug went to India and decided there was no reason his wheat could not grow there, and soon his seeds were on their way. In 1965 and 1966, before the new variety could be widely planted, India's monsoons failed, and the United States shipped almost a fifth of its own wheat harvest to India.

Today that flow has stopped, and about 80 per cent of the land in the Punjab wheat basket is planted with the "miracle" wheat. Local farmers have modernized their methods, apply strict water control and use enormously increased quantities of fertilizers, pesticides and insecticides. Yields are estimated at two or three times the old level.

What happened in wheat was repeated in rice, the vital Asian crop, thanks to the International Rice Research Institute in the Philippines. Scientists there produced IR-8, a rice variety that grows much more abundantly and quickly.

Triple-cropping the rice has given as much as eight tons of grain per acre, instead of the customary two. One esti-

mate of added rice crop value since the introduction of IR-8: \$1.5-billion.

Today the work of the Mexican and Philippine centers—as well as that of the International Institute of Tropical Agriculture in Nigeria and the International Center of Tropical Agriculture in Colombia—are financed in large part by the Ford, W. K. Kellogg and Rockefeller Foundations in Canada and the United States Agency for International Development.

The benefits have been enormous but there has also been skepticism. The new rice, for example, turns out to be sticky and of inferior taste. Developing countries are short of stor-

age facilities, marketing methods are primitive and necessary credit is often unavailable. Some experts warn that reliance on a particular strain of wheat or rice makes crops susceptible to overwhelming catastrophe in the event of disaster. Some experts foresee political and social problems.

To whom will traditional exporters such as Burma and Thailand sell their rice? What will be done about the Indian tenant farmers who have become sharecroppers? How can benefits be generalized without land reform — in Latin America no

Through increased productivity, the green revolution may

mean less employment in Asia — and scores of millions are already unemployed and living in tragic misery. So there has been no outcry to stop the insistence on birth control as a means of dealing with overpopulation.

As is traditional with revolutions, the principal crop has occasionally been a barely nutritious rhetoric that has only whetted appetites. Accordingly, Indira Gandhi, India's Prime Minister, advised the Chief Ministers of the Indian States: "The warning of the times is that unless the green revolution is accompanied by a revolution based on social justice, the green revolution may not remain green."