

lemon trees apparently infected only with exocortis. Indexing for exocortis has been completed for 244 exocortis-free and 125 exocortis-infected trees, including many trees with symptoms on their rootstocks. Inocula from all trees with exocortis symptoms caused a reaction on the citron indicator plants.

Three effective and practicable methods of indexing were:

Citron on budded seedling—A citron bud was grown into a shoot on an exocortis-inoculated seedling of a suitable variety such as rough lemon (*C. jambhiri* Lush.), Mexican lime (*C. aurantiifolia* (Christm.) Swingle), or *C. excelsa* Wester and observed for five months. The citron bud and one or more buds from the infected tree were set close together or in contact with each other, photo 1. Pre-inoculation or simultaneous inoculation and propagation favored early reaction, which sometimes occurred within one month in the developing citron shoot. This method made efficient use of citron budwood and was successfully used on plants already budded for psorosis, tristeza, and tatter-leaf indexing.

Splice graft on citron cutting—A diagonal splice was used to graft a two- to three-inch section of an exocortis-infected shoot onto a citron cutting, photo 2. The citron cutting was rooted and allowed to grow, but shoots on the inoculum piece were pinched back.

Budding on citron—Two or more buds of an exocortis-infected tree were grafted to a citron budding or cutting, which was then cut back to force new growth.

Most plants of seedling 60-13 and Etrog citron PI 109620 reacted to exocortis infection within three months. The first symptoms were epinasty (bending downward) of the leaves, and cracking of the lower side of midveins, photo 3. Some severely affected leaves curled downward from the tip, while the blades twisted to varying degrees from the normal plane, photo 4. Other symptoms included dwarfing, stem epinasty, small corky lesions or vertical cracking of the stem, photo 5, and yellow blotching of the stem. Sometimes the petiole bases and the lower sides of principal veins showed abnormal darkening. Mature leaves of some plants dried up while firmly attached. Response of the indicator shoots of both citron selections was about the same with all methods of inoculation, but variations in symptoms among plants of the same clone inoculated with buds from different trees indicated that variations

may exist in the exocortis virus. Many citron seedlings, such as 60-7 from Etrog, were poor indicators of exocortis, photo 6.

Plants of seedling 60-13 responded with exocortis symptoms when inoculated with buds infected with exocortis, and other viruses, such as cachexia, concave gum, psorosis-A, stubborn, tristeza, tristeza-seedling yellows complex, and vein enation. Epinasty of the leaves occurred on plants inoculated from trees infected with a virus that caused stunting without bark cracking of trifoliolate orange rootstocks.

Plants of Etrog citron or seedling 60-13 were inoculated separately with cachexia, concave-gum, infectious-variegation, psorosis-A, stubborn, tatter-leaf, tristeza, tristeza-seedling yellows complex, vein enation, and yellow-vein viruses from exocortis-free buds. Although the plants reacted to certain of these viruses, the symptoms did not closely resemble those of exocortis infection. All control plants remained symptomless during the indexing period, but several in one glasshouse reacted later. Infestations of citrus red mite, *Metatetranychus citri* (McG.), a species of whitefly and citrus thrips, *Scirtothrips citri* (Moult.) were noted in this glasshouse. No natural spread of the virus into control plants was apparent in the insect-free quarantine glasshouse. The possibility of vector transmission is being investigated.

To avoid confusing or erroneous results in these tests, it was found necessary to maintain the citron budwood supply and the indexing plants in separate pest-free compartments in order to avoid accidental spread of exocortis virus; to propagate control plants from each citron tree used; to maintain good growth in the index plants; to avoid infection of seedling stocks; and to use the most sensitive citron selections.

Rapid detection of exocortis virus has already accelerated certain phases of research on citrus virus diseases and should soon permit the identification of sufficient numbers of exocortis-free trees to meet grower requirements for most varieties.

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CALIFORNIA and WORLD

AS THE WORLD'S largest trading country, the United States has recognized both the advantages and responsibilities of international trade and development activities of the current decade. Since the late President Kennedy signed the Trade Expansion Act of 1962, the United States has been preparing for the "Kennedy Round" of tariff talks under the auspices of the General Agreement on Tariffs and Trade (GATT). The transition period has been characterized by: (1) a new high level for U.S. exports with merchandise shipments totaling nearly \$22 billion for 1963, while merchandise imports have also risen to almost \$17 billion; (2) further growth in U.S. farm exports to a total of \$5.6 billion in 1963—a little over 27% of all U.S. exports; (3) increased attention from the U.S. as well as regional and international organizations to the trade and development needs of less developed countries.

U.S. and trade expansion

United States merchandise exports (excluding military sales) have increased in value from \$12.3 billion in 1953 to \$21.9 billion in 1963, while imports for consumption have increased from \$11 billion to \$16.9 billion in the same period. On the average, U.S. total exports since 1960 (exclusive of military special shipments) have been just over 3.5% of the gross national product and imports just under 2.9%—the relationship remaining almost stationary for 1962 and 1963.

While increases have been characteristic of total U.S. trade, the regional destination of shares of U.S. total exports has stayed remarkably stable. Canada, the major single-country recipient of U.S. exports, has a slightly smaller current share (about 20%), with the main growth in the "all Western Europe" share of U.S. exports and a steady decline in Latin America's share (even excluding Cuba). United States total imports have had an even greater stability of division among regions, with Canada, Europe, and Latin America as the major suppliers.

United States agricultural exports, which amounted to \$5.6 billion in 1963,

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grew 45% over the level five years earlier. The slightly increasing percentage of U.S. agricultural exports in relation to total trade since 1959 would seem to be a contrast to the historical experience of industrialized nations and to earlier U.S. trends. However, 33% of U.S. agricultural exports have been shipped under government financed programs since 1955. Even during the years since 1960, 31% have been handled in this manner.

United States agricultural imports remained relatively stable in dollar terms since 1958, but the share of total U.S. imports decreased. Currently, less than

being in commercial sales. Japan has become the top single-country market for United States agricultural exports, followed by Canada and the United Kingdom. West Germany was fourth in 1963, although its U.S. agricultural imports showed a decline from the previous five years.

The European Economic Community (Common Market), considered as a region, is a major regional trading partner. United States agricultural exports valued at \$1.1 billion went to the Common Market countries in 1963, an increase of over 40% since 1958.

Changing patterns

In 1963, 10 countries accounted for over 61% of total U.S. agricultural exports. Seven of these are industrialized nations. The three considered less developed—India, Pakistan, and Egypt—receive U.S. special program agricultural shipments of wheat, flour, rice, and similar commodities.

For the first time since the boom in

need to consider not only trade in primary agricultural products (wheat, rice, other feed grains, sugar, coffee, livestock, etc.), but also processed agricultural commodities such as food preparations, processed wood, pulp, and paper. Also, there is trade in agricultural raw materials (wool, cotton, rubber, jute, tobacco, etc.). The problems in international trade between the more developed and less developed nations revolve mainly around these commodities, since agriculture plays such a large role in the economic structure of most of the less developed countries.

Also, there is the somewhat separate problem of international trade in temperate zone products. The major agricultural products of the industrial and more developed nations are in this category—grains, meat, and dairy products. These commodities account for many of the very sizable increases in trade volume during the past five years attributable to North America and Europe. (In the case of western Europe, much of the expansion in agricultural trade is actually intraregional.) Problems of a political nature are also found in this area: interrelating trade barriers, regional blocs, former colonial ties, and divergent East-West trading systems, with the already complex agricultural policies of the major industrialized nations. The United States plays an important and complicated role in this pattern.

In the postwar world, it is also necessary to differentiate between commercial agricultural trade as opposed to trade under special agreements and special programs. Here, also, the United States plays a dominant role both as a supplier and as a participant in exchange arrangements to make "aid" shipments possible. These programs have, in turn, been influenced by internal agricultural policies, and the direction of agricultural trade as a whole cannot be viewed without recognition of the special conditions under which these agricultural products move.

World agricultural trade is characterized by differing trends and rates of growth in individual commodities. Here again the problem of agricultural trade is linked to economic development in the less developed countries where some of these products are the staple or single export. In addition, the technological changes inherent in successful production of synthetics or substitutes for major agricultural raw materials (for example, in place of rubber, wool, cotton, and other textiles) make interpretation of the fu-

Trade expansion for California is being examined currently as much for its balance and composition as for its increases. Efforts being made to stimulate California export trade are of a long-run nature to develop commercial markets. The state and its agricultural industries, faced with the need and opportunity for enlarged markets abroad, are recognizing that we cannot stand aloof. What is happening in the European Common Market, the changing trends of world trade, and the relations between the developed and newly emerging nations all affect the future of California agriculture. This article discusses agriculture in the pattern of international trade.

one-quarter of the nearly \$17 billion total import value coming into the U.S. is attributable to agricultural products. Last year, the dollar increases in U.S. agricultural imports were mainly in noncompetitive commodities, such as coffee and bananas, though higher prices also accounted for some of the higher dollar value.

Europe is still the major destination for U.S. agricultural exports, though its share of the total is less. While exports of agricultural products to Europe in earlier years amounted to about half the U.S. total, they now total about 42%. Latin America is the major U.S. supplier of agricultural imports, but their share is declining while the Australia-New Zealand region has increased its share of the total, though valued below 10% of the U.S. total. Record United States agricultural exports in 1963 meant larger shipments to all world areas except Africa and Oceania, with nearly all the increase

agricultural prices during the Korean War, the terms of trade stabilized or slightly improved in 1963 for the less developed countries. The inherent difficulties of the agricultural trade relationships and structure, however, have certainly not been solved, although the problem has brought discussion along new lines. Worldwide adjustment of the traditional principle of trade reciprocity has been considered as well as the international commodity agreement approach to agricultural trade problems.

Global terms

About one-third of worldwide international trade consists of exchange in agricultural products. In this category are included food and foodstuffs—beverages, tobacco, oilseeds, and oil—and agricultural raw materials, excluding fuels and metalliferous ores.

Complexities in the pattern of international trade in agriculture include the

ture role of agriculture in international trade patterns even more unpredictable.

General worldwide trade has shown growth in dollar value as well as increases in volume. The major trade flows are between the more developed countries, with their exports continuing to expand. The less developed countries have also tended to gain in exports, but their rate of growth has been less strong. Thus, the more developed nations, which already accounted for the major part of world exports a decade ago, have since then increased their share of world exports even more. This was one of the major problems that the United Nations Conference on Trade and Development considered during the spring of 1964.

International trade in agricultural primary products has been characterized in the past decade by relatively slow growth of volume, falling unit values and terms of trade, and consequent slow growth in agricultural export earnings. Thus, trade expansion as such, while bringing economic benefit in its overall aspects, also emphasized certain imbalances for primarily agricultural exporting countries—in large part, the less developed nations. Some of these developing countries have been, by "accident" of geographical location and natural resources, dependent upon a few or sometimes even a single agricultural commodity to bolster internal economic development and pay for import requirements.

In speaking of industrial or more developed areas, we include in general North America, western Europe, Australia, New Zealand, South Africa, and Japan. Less developed areas roughly include all others, with the exception of the centrally planned economies of the Soviet and Sino blocs (also referred to as the Eastern Trade area). That area is estimated to account for about 12% of the world's export value, 11% of which is in agricultural products.

World agricultural trade

While world trade in manufactured goods expanded by about 65% during the decade preceding 1962, the volume of world trade in agricultural products (excluding trade among the centrally planned economies) increased by about 36%. If commercial agricultural trade alone is measured, the increase was nearer 27%. By the 1960's, over two-thirds of all merchandise trade was shipped by developed regions, and 46% was shipped to other developed regions. A generalized view of agricultural trade also shows that

over two-fifths of the 53% share that the developed regions have of world trade in agricultural products is destined for other developed regions. In addition, the slower growth in value of these agricultural shipments has been intensified by the persistent, and in some cases pronounced, decline in unit value. This is true for both developed and developing areas (and disparities between the levels of the two are almost erased when commercial value alone is examined), but the impact is stronger on those developing regions dependent in large part on agricultural products for export earnings.

When separate regions are analyzed and the network of international trade is observed in more detail, the difference in the composition of trade of various areas becomes evident. Latin America has been hardest hit by the deterioration in average unit value because of the commodity composition of its agricultural trade. About 50% of Latin America's export trade has been, and continues to be, in agricultural products. Latin America's most serious problems stemmed from heavy concentration on coffee, combined with price declines for cocoa, grains, and textile fibers. Southeast Asia, whose volume of exports has not increased at even the rate or amount of other less developed areas, is dependent on earnings from agricultural exports which account for nearly 65% of the area's total export trade. Due to exceptional prices of rubber and tea during the decade, this region's average export unit value was reduced only about 5%.

Japan, which has been in the process of further industrialization, has shown a decreasing ratio of agricultural to total exports in the last decade—from nearly 17% to approximately 10%. Australia, New Zealand, and South Africa also have shown a similar decrease, although in these three countries agricultural trade still constitutes 75% of all export trade.

In the less developed countries, however, where the larger part of their trade consists of an exchange of agricultural for manufactured goods and the dependence on export earnings of agriculture is acute, slow growth of exports has of necessity affected the growth of their imports. In addition, the widening gap in their overall trade balance has become a worldwide problem with both economic and political repercussions. One of the basic reasons for the formation of regional trade and economic blocs involved the search for a partial answer to such problems as the gap in the trade balance of less developed areas.

U.S. economic aid

The tendency of the newly developing countries to concentrate on relatively few export products has been in part intensified by the production pattern of the industrialized countries. The expansion of trade in these developing countries may also need the stimulation of a wider range of exports in the interest of more balanced economic development. The U.S., with its foreign assistance and economic aid programs, has given considerable attention to the problem during the past few years.

The slow expansion of exports the non-industrial areas had been showing, in relation to that of the developed nations, has been somewhat less characteristic since the beginning of 1962. The relative improvement for agricultural trade in the newly developing areas may be due to increased exports of foodstuffs and agricultural raw materials and isolated price advances. But it is clear that the basic factors which tend to depress agricultural prices and create problems in world agricultural trade are of a substantially complex, long-run nature.

Current U.S. foreign trade shows the dominance exerted by the general trade relationship between North America and western Europe. Short-run attention, stimulated by the formation of the European Common Market, focuses upon western Europe where trade partnership is of essential importance to the U.S. and where intensified efforts have been made to improve our competitive position in agricultural products as well as all others. These industrialized areas with high levels of income, now augmented by Japan, are major importing markets for agricultural products.

But over the long term, less developed countries are potential markets for larger quantities of products from the United States, both agricultural and nonagricultural. Immediate trade benefits may be gained from the current economic growth and trade partnership of western Europe. The more distant goal of balanced agricultural production and trade, for the U. S., as well as for other economic regions within the overall foreign trade pattern, remains to be implemented through evaluation and adjustment of both economic and political aims.

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