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ECONOMIC INTELLIGENCE REPORT

**AGRICULTURAL INVESTMENTS
AND IMPROVEMENTS IN COMMUNIST CHINA
1953-62**



**CIA/RR 103
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**CENTRAL INTELLIGENCE AGENCY
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(ORR Project 21.1704)

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FOREWORD

The purpose of this report is to analyze and assess present and proposed agricultural developments in Communist China under the First and Second Five Year Plans (1953-57 and 1958-62). Special emphasis is given to investment and to measures for increasing agricultural production.

The analysis of agricultural production in this report is limited to grains and cotton. It is believed that the results obtained from an analysis of investment and of measures to increase production represent maximum possibilities, and any degree of error inherent in this analysis would tend, therefore, to overestimate production.

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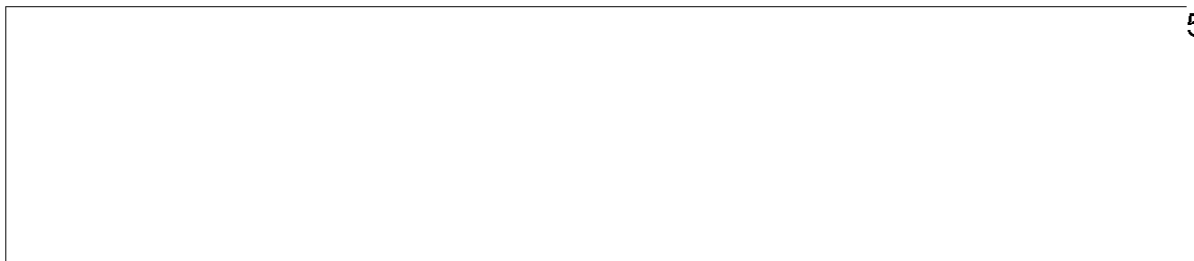
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AGRICULTURAL INVESTMENT AND IMPROVEMENTS
IN COMMUNIST CHINA*
1953-62

Summary

The government of Communist China has sought to meet the growing needs of an expanding economy through a program for the socialization of agriculture. To implement this program, the Communists have sought to eliminate the small independent farmers and to achieve complete control over agricultural producers and their products. The rapid organization of agricultural producer cooperatives in 1956 raised the percentage of organized farmer households to 96 percent by the end of the year, and the program for socialization is almost complete.

State investment in agriculture under the First Five Year Plan (1953-57), however, has been insufficient to achieve the goals for agricultural production. Such investment has comprised only 7.6 percent of the total investment planned for the period. This amount has not been sufficient to supply the necessary quantities of inputs, especially of chemical fertilizers. In an attempt to resolve this problem, the government has transferred the bulk of the burden of investment in agriculture to the cooperatives. Since 1955, cooperative farm labor has been utilized intensively on local projects for irrigation, water conservation, and land reclamation. The increase in agricultural production resulting from these local projects accounted for more than 60 percent of the increase in the production of grains** during 1953-57. An examination of state and cooperative investments, however, indicates that increases in the production of grains during 1953-57 will enable the Chinese at most to raise the total production of grains in 1957 to 185.6 million metric tons,*** or 96 percent of the goal of 192.8 million tons announced in the First Five Year Plan.

* The estimates and conclusions in this report represent the best judgment of ORR as of 1 August 1957.

** In Communist China, grains include all cereals, pulses, soybeans, and potatoes on a grain-equivalent basis.

*** Tonnages are given in metric tons throughout this report.

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The goal of 1.6 million tons for the production of ginned cotton* probably will be achieved.

The limits to which cooperative labor using local investment can carry out effectively the proposed project for irrigation, water conservation, and land reclamation should be nearly reached by the end of 1962. Thereafter, such undertakings will require greater amounts of capital than can be furnished locally.

Any significant increases in agricultural production in Communist China will depend primarily upon the supply of chemical nitrogenous fertilizers. Requirements for chemical fertilizers have been estimated at approximately 20 million tons a year, or about 10 times the amount consumed in 1956. Attempts are being made to alleviate this deficit by increasing the supply of organic fertilizers.

It has been stated that increased supplies of chemical fertilizers and other inputs required for agricultural production will be provided under the Second Five Year Plan (1958-62) through an increase over the amount invested under the First Five Year Plan. Allowing for the maximum utilization of all available inputs under the Second Five Year Plan, the production of grains in 1962 probably will not exceed 217.8 million tons, or 87 percent of the goal of 250 million tons. The goal of producing 2.4 million tons of cotton may be achieved.

Increases in the production of grains through the end of 1962 probably will be sufficient to maintain the supply per capita of food at present levels of consumption. After 1962, however, unless the production of grains can be increased at a rate which equals or exceeds the increase in population, Communist China may be forced to become a net importer of food.

I. Introduction.

The "high tide of socialist transformation of agriculture" which was decreed by the Party leadership in Communist China in the latter half of 1955 has changed profoundly the structural organization of

* Cotton is reported on a ginned basis throughout this report.

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the agricultural economy and the trend of agricultural development. 1/*
Under the accelerated program for socialization, the government has
extended state controls in order to expand agricultural production and
to bolster industrial investment. 2/

The failure to achieve agricultural goals in 1953 and 1954 and a
general pessimistic attitude toward the pace of socialization had led
to a series of decisions by Mao Tse-tung and the Central Committee of
the Chinese Communist Party. The floods of 1954 resulted in a reduc-
tion of agricultural production, which in turn reduced the production
of light industry and the hoped-for increases in revenue in 1955. 3/
The projected rates of investment in heavy industry in 1955 required
substantially increased investment by the agricultural sector of the
economy. It was clear that these requirements could be obtained only
by extending state control over agriculture through the program for
socialization and through substantially increased agricultural pro-
duction by means of increased investment. Mao Tse-tung, in his re-
port of 31 July 1955, after the relatively limited goals of the First
Five Year Plan (1953-57) had been accepted by the National Peoples
Congress, strongly criticized the conservative elements of the Party
for their lagging efforts on behalf of the program for socialization
of agriculture and outlined a new program calling for acceleration
of socialization. 4/

Partly as a result of the enthusiasm stimulated by the drive for
socialization, a broad agricultural program was announced early in
1956. 5/ This program, known as the Twelve Year Draft National Pro-
gram for Agriculture, outlines several courses of action which are to
be pursued simultaneously in an ambitious attempt to increase the pro-
duction of grains and cotton by 1967. 6/ The Second Five Year Plan
(1958-62), although following the operational pattern of the 12-year
program, is less unrealistic in its specific goals for production.

As a result of the accelerated program for socialization, 1956
became a key year for the transition of agriculture from private to
state control. The bumper harvest of 1955 largely eliminated the
difficulties encountered in 1954 by the Party cadres in fulfilling
plans for the allocation of grains and industrial crops and in or-
ganizing the farmers into cooperatives. By the end of 1956, approxi-
mately 96 percent of the farm households in Communist China were or-
ganized into agricultural producer cooperatives. 7/ By means of rapid

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socialization the surplus of labor on cooperative farms is being utilized in projects to consolidate small farm plots into large fields; to construct dikes and ditches for flood control and irrigation; to engage in land reclamation; and to consolidate the collection, handling, and storing of organic fertilizers. In addition, socialization is to provide the means for the better planning of crop planting and rotation, the allocation of resources for investment, and the control of production through state channels. 8/

In presenting his proposals on agriculture for the Second Five Year Plan at the Eighth Party Congress in September 1956, Chou En-lai reaffirmed the statement by Mao on the indispensability of agricultural development for the development of heavy industry and of the entire national economy. 9/ Increases in agricultural production under the Second Five Year Plan were to be achieved through increased yields per unit of land. 10/ Although no detailed information as to the composition of agricultural investment during this period was given, it was estimated that agricultural investment would increase from 2.47 billion yuan* under the First Five Year Plan to 7 billion yuan under the Second Five Year Plan, an increase of 283 percent. 11/ In addition, investment in capital construction for the chemical fertilizer industry is to be increased under the Second Five Year Plan. 12/

II. Goals for Production.

A. First Five Year Plan (1953-57).

The over-all goals for agricultural production in Communist China during the last 3 years of the First Five Year Plan were outlined in great detail in an important speech by Li Fu-ch'un, Chairman of the State Planning Commission, at a session of the National Peoples Congress in July 1955. 13/ Li stated that by 1957 the production of grains was to increase to 192.8 million tons, and the production of cotton to 1.6 million tons. 14/ The reported and planned production of grains and cotton in China in 1952-57 and that planned for 1962 are shown in Table 1.**

* An acceptable rate of exchange, based on commercial rates of exchange with the pound sterling, is 2.46 yuan to US \$1.

** Table 1 follows on p. 5.

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Table 1

Production of Grains and Ginned Cotton in Communist China a/
1952-57 and 1962

Thousand Metric Tons		
<u>Year</u>	<u>Grains</u>	<u>Ginned Cotton</u>
1952	163,900	1,305
1953	166,800	1,175
1954	168,800	1,065
1955	184,000	1,518
1956 <u>b/</u>	199,450	1,775
1956 <u>c/</u>	192,000	1,460
1957 <u>d/</u>	192,800	1,635
1962 <u>e/</u>	250,000	2,400

- a. 15/
b. Revised Plan announced 23 December 1955.
c. Reported figures. 16/
d. Original Five Year Plan announcement.
e. Plan announced 15 September 1956.

Among the specific measures listed by Li for increasing production were the reclamation of arable wasteland; the construction of projects for irrigation and water conservation; the increased planting of such high-yield crops as rice, corn, and potatoes; the increased supply of manure and chemical fertilizers; the introduction of improved animal-drawn farm implements; and the elimination of insects and pests.

As a result of the enthusiasm generated by Mao Tse-tung's speech of July 1955, goals for agricultural production were reported by the New China News Agency (NCNA) on 23 December 1955. The NCNA stated that the First Five Year Plan was to be completed in advance and the goals set in July 1955 for production in 1957 were to be reached in 1956. 17/ The new goal for the production of grains was stated as 199.4 million tons, an increase of 6.6 million tons above the original goal for 1957. 18/ The goal for the production of cotton was raised to 1.78 million tons. 19/

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On the basis of data given in September 1956 on the production of grains and cotton under the Second Five Year Plan, it appears that Chinese Communist officials returned to the goal of the original First Five Year Plan as the basis for the new Plan. 21/ The revised goals were canceled, probably because of the losses in crops resulting from floods and storms in 1956.

B. Second Five Year Plan (1958-62).

Goals for agricultural production under the Second Five Year Plan were reported first on 15 September 1956 and confirmed later by various pronouncements made at the Eighth Party Congress. The production of grains is scheduled to total 250 million tons in 1962, and the production of cotton is set at 2.4 million tons. 22/

Under the Second Five Year Plan, emphasis is to be placed on the use of cooperative farm labor on small-scale projects for irrigation and flood control, the improvement of agricultural practices, the greater use of natural fertilizers, a small increase in the use of chemical fertilizers, an increase in large-scale cultivation by the consolidation of small plots into large fields, the increased use of improved tools and machinery, and the increased use of better seeds and pesticides. The principal results of the new program are to be realized from the intensive efforts of the cooperatives. 23/ It is generally admitted by the planners that many rivers which are likely to cause havoc cannot be harnessed, that reclamation work on a larger scale cannot be undertaken, and that conditions are not present for the mechanization of agriculture. 24/

III. Investment.

The programs for investment in agriculture in Communist China are carried out by the state and by the farmers. Investment by the state during 1953-62 is being carried out through the First and Second Five Year Plans, and investment by the farmers is effected through the savings of agricultural producer cooperatives and through agricultural loans by the government to the cooperatives and to individual farmers.

The First Five Year Plan called for the investment by the state of 2.47 billion yuan for agriculture, water conservation, and forestry.* 25/ This figure is 5.8 percent of total investments scheduled

* Excluding investment in the lumber industry.

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under the First Five Year Plan; the share of industry was scheduled to be 58.2 percent. The Second Five Year Plan is believed to call for the investment of approximately 7 billion yuan for agriculture, water conservation, and forestry.* 26/ This amount is 8.2 percent of total investments proposed under the Second Five Year Plan, whereas the scheduled share of industry is 60 percent.

Most of the investments by the state in basic construction for agriculture are used for water conservation. 27/ Relatively small sums are spent by the state for land reclamation, the organization of state farms, the mechanization of agricultural operations, and the improvement of agricultural techniques through the establishment of agro-technique stations and similar organizations.

In addition to the funds earmarked for investment in agriculture under the First and Second Five Year Plans, the state is making limited expenditures for building chemical fertilizer plants and agricultural equipment plants. 28/ The capacity of the proposed chemical fertilizer plants, however, will fall short of filling the needs of Communist China through 1963.

Water conservation will receive more emphasis than any other element of the program for basic construction for agriculture in China through 1962. The contribution of the state to this program consists for the most part in building very large water control projects which will serve for flood control, erosion control, the development of hydroelectric power, and the extension of navigation. 29/ The increase in the area of farmland under irrigation is a minor part of this program for water conservation, and only a small part of the investment will result directly in increased agricultural production. Most of the efforts toward water conservation by the state will have long-range effects, diminishing the threat of floods and making water available in areas hitherto lacking in water.

* The proposed plan called for an investment of about 8.5 billion yuan, which presumably includes investment in the lumber industry. If the lumber industry is to have at least the same share of total investment under the Second Five Year Plan as under the First Five Year Plan, the planned investment in the lumber industry should be about 1.5 billion yuan. This sum should be subtracted from the total of 8.5 billion yuan in order to compare agricultural investment under the First and Second Five Year Plans.

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As for increasing the area of farmland under irrigation, the farmers themselves, through the intensive efforts of the cooperatives, will bear most of the burden. Under the First Five Year Plan, about 75 percent of the increase in the area under irrigation has been achieved through cooperative labor. 30/ The activity of the farmers in small-scale projects probably will continue through 1962. 31/

IV. Measures to Increase Production.

A. Irrigation and Flood Control.

1. First Five Year Plan (1953-57).

The Ministry of Water Conservancy stated that the First Five Year Plan originally called for an increase of 2.8 million hectares* of irrigated fields. This goal has been raised to 4.8 million hectares. 32/ Although the expansion of the area under irrigation through 1956 was reported to be only 1.9 million hectares, 33/ it appears reasonable that the revised goal for 1957 will be achieved. The increases in the area under irrigation in Communist China in 1952-57 and that planned for 1962 are shown in Table 2.

Table 2

Increases in Area Under Irrigation in Communist China
 1952-57 and 1962

Year	Area Under Irrigation	Million Hectares	
		Increase over Previous Year	Increase over 1952
1952	30.7 <u>a/</u>	N.A.	0
1953	31.0 <u>a/</u>	0.3	0.3 <u>a/</u>
1954	31.6 <u>a/</u>	0.6	0.9
1955	N.A.	N.A.	N.A.
1956	32.6 <u>b/</u>	N.A.	1.9
1957 <u>c/</u>	33.5 <u>d/</u>	0.9	2.8
1957 <u>e/</u>	35.5 <u>f/</u>	2.9	4.8
1962	45.1 <u>g/</u>	N.A.	14.4

a. 34/ c. Five Year Plan. e. Revised Plan. g. Estimated.
 b. 35/ d. 36/ f. 37/

* One hectare equals 2.471 acres.

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Of the planned increase in the area under irrigation by the end of 1957, 3.5 million hectares will be devoted to rice, 300,000 hectares to other grains, and 1 million hectares to cotton. 38/

2. Second Five Year Plan (1958-62).

Detailed information as to the increase in the area under irrigation scheduled under the Second Five Year Plan has not been reported. On the basis of the expected increase in investment, however, it is reasonable to assume that the increase in the area under irrigation will be about 9.6 million hectares, or twice the increase achieved under the First Five Year Plan.*

Projects for water conservation and irrigation have been begun on the Yellow and Huai Rivers. The Yellow River project is expected to bring 2.4 million hectares under irrigation by 1967, although the final figure is expected to be about 7.7 million hectares. 39/ It is possible that some increase in irrigation resulting from this project may be available by 1962.

Considerable progress is being made in local projects through the construction of dams and through the digging of wells and channels for irrigation. It is stated that the cooperative movement will assist the projects by providing capital and labor, especially because each man must put in 250 work-days and each woman 120 work-days per year. 40/ It is expected that about one-third of the man-days provided will be available for such work as irrigation, land reclamation, and afforestation. There has been a marked acceleration of this type of work since the beginning of the drive for socialization.

Of the newly irrigated land planned for 1962, it is estimated that 7 million hectares will be cultivated to rice, 300,000 hectares to other grains, and 2.3 million hectares to cotton.

3. Effects on Production.

Irrigation is one of the most effective means of increasing agricultural production in Communist China. Larger increases in yields per hectare can be obtained through the use of chemical fertilizers, but the cost is much higher, especially when the costs of chemical

* See Table 2, p. 8, above.

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fertilizers are compared with the cost of local projects for irrigation,* to which very little, if any, state investment is allocated. These local projects have accounted for the bulk of the increases in irrigation to date, but the extent to which such projects can continue to increase production is limited. In the long run the cost of irrigation will be increased by the requirements for construction, and the comparative cost in relation to the use of fertilizer probably will be reversed.

The crops most benefited by irrigation are rice and cotton. In 1957 these two crops will utilize 94 percent of the increase in the area under irrigation and by 1962 about 97 percent. The remainder of the increase will be devoted to other grains.

The increases in the production of grains resulting from the increased area under irrigation probably will total 5.3 million tons under the First Five Year Plan and 10.3 million tons under the Second Five Year Plan. Of these totals, it is estimated that rice will account for 5 million tons under the First Five Year Plan and 10 million tons under the Second Five Year Plan. Increases in the production of cotton resulting from the increased area under irrigation are expected to be about 127,000 tons under the First Five Year Plan and 291,000 tons under the Second Five Year Plan.

B. Chemical Fertilizers.

The principal deficiency of the soil in Communist China is nitrogen. The increased use of commercial nitrogenous fertilizers probably would be the greatest single factor in improving the yield per hectare. Because of the lack of livestock farming, there is insufficient natural fertilizer. Although every scrap of human and animal feces is conserved, the traditional use of the material has been inefficient.

The Minister of Agriculture has placed the requirements for chemical nitrogenous fertilizers at 20 million tons, 41/ a figure closely comparable with non-Communist estimates. Present usage in China is only about 10 percent of this amount. If such a supply of chemical fertilizers were available, it is estimated that the total cost would be about US \$1.1 billion to US \$1.4 billion per year. 42/

* Local projects for irrigation are those involving mainly farm labor using simple hand tools to construct wells and ditches for irrigation.

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The most important nitrogenous fertilizer used in Communist China is ammonium sulfate, which experiments have proved to be the most beneficial to the soil. Ammonium sulfate probably will account for about 98 percent of the supply of nitrogenous fertilizers in China during 1953-62.

1. First Five Year Plan (1953-57).

The lack of chemical fertilizers in Communist China is reflected in the First Five Year Plan. In 1957 the production of chemical nitrogenous fertilizers is expected to reach only about 548,000 tons. ^{43/} Although no plan for imports was announced, it is estimated that approximately 1.85 million tons will be imported. The total supply of chemical fertilizers in 1957 would therefore be about 2.4 million tons, an increase of about 2 million tons over 1952. The supply of chemical fertilizers in Communist China in 1952-57, that planned for 1962, and the estimated probable supply in 1962 are shown in Table 3.*

The goals for the production of phosphate fertilizers in 1957 were not given, but it is estimated that about 400,000 tons probably will be made available by 1957, an increase of more than 390,000 tons over 1952.

In 1955, state investment in the chemical industry was scheduled to increase over the previous year, and two-thirds of the amount invested in the industry was allocated for chemical fertilizers. ^{44/} Three new plants were to be built and two others were to be reconstructed by 1957.

2. Second Five Year Plan (1958-62).

The goal for the production of chemical fertilizers in 1962, 3.0 million to 3.2 million tons, is more than five times the goal for production in 1957. ^{45/} Details of the program for the production of chemical fertilizers under the Second Five Year Plan are not available, but the program appears to be controlled by a limited budget rather than by the requirements of vigorous agricultural development. The First Five Year Plan called for the construction of plants to produce nitrogenous and phosphate fertilizers, and there is no indication that any additional construction of plants to produce

* Table 3 follows on p. 12.

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Table 3

Supply of Chemical Fertilizers in Communist China
 1952-57 and 1962

Metric Tons

Year	Nitrogenous Fertilizers ^{a/}			Phosphate Fertilizers ^{b/}
	Production	Imports	Total Supply	
1952	188,500 ^{c/}	225,000 ^{d/}	413,500	5,500
1953	250,000 ^{d/}	400,000 ^{d/}	650,000	10,000
1954	330,000 ^{d/}	600,000 ^{d/}	930,000	15,000
1955	356,000 ^{e/}	1,200,000 ^{f/}	1,556,000	20,000
1956	490,000 ^{g/}	1,500,000 ^{f/}	1,990,000	200,000
1957 ^{h/}	548,000 ^{i/}	1,850,000 ^{f/}	2,398,000	400,000
1962	3,000,000 ^{j/}	N.A.	N.A.	N.A.
1962 ^{k/}	1,200,000	3,300,000	4,500,000	1,800,000

a. Ammonium sulfate and ammonium nitrate.

b. ^{46/}. Mainly rock phosphate. Domestic production only, no phosphate fertilizers are imported.

c. ^{47/}

d. ^{48/}

e. Including 324,000 tons of ammonium sulfate and 32,000 tons of ammonium nitrate. ^{49/}

f. Estimated.

g. Including 444,000 tons of ammonium sulfate and 46,000 tons of ammonium nitrate. ^{50/}

h. Plan.

i. ^{51/}

j. Plan for total production of all chemical fertilizers. ^{52/}

k. Estimate of the probable supply.

nitrogenous fertilizers is planned. Current construction of such plants is devoted primarily to the expansion of existing facilities or the building of byproduct facilities at steel plants, both of which are considerably less expensive than new construction. Any additional new construction of plants to produce nitrogenous fertilizers under the Second Five Year Plan would have to be started soon because the Chinese Communists say that it requires 5 or 6 years to construct such a plant.

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In most cases the phosphate fertilizers planned for 1962 apparently are to be produced by the simple method of grinding phosphate rock into granular form, although this type of fertilizer contains much less nutrient value than other chemical fertilizers. The construction of facilities for producing phosphate fertilizer of this type requires relatively less capital investment than is necessary for the more complex process of producing nitrogenous fertilizers. It is estimated that of the approximately 3 million tons of chemical fertilizers which will be produced annually by 1962, 1.8 million tons will consist of phosphate fertilizers and 1.2 million tons of nitrogenous fertilizers.

3. Effects on Production.

Although the supply of chemical fertilizers in Communist China has been increased, only a small portion of the total area under cultivation will be fertilized soon. Distribution will continue to be on a priority basis, with major emphasis given to rice, cotton, high-yielding grain crops such as corn, and technical crops such as tobacco. By far the greatest quantity will go to rice. Numerous experiments conducted in China have shown that the increased yield per hectare from the use of nitrogenous fertilizers is extremely good, particularly in the alluvial areas on which most of the paddy rice is cultivated.

The increase in the supply of chemical fertilizers under the First Five Year Plan will make possible an estimated increase in the production of grains of about 4.6 million tons, of which rice will account for 4.4 million tons. The production of cotton will increase about 75,000 tons during the 5-year period.

The probable increase in the supply of chemical fertilizers under the Second Five Year Plan will make possible an increase in the production of grains of about 5.7 million tons, including 4 million tons of rice, and an increase in the production of cotton of about 176,000 tons.

C. Organic Fertilizers.

The principal fertilizers used in Communist China today are organic fertilizers, especially night soil and manure. River and pond mud, oilseed cake, and vegetable wastes are also used extensively. For centuries, Chinese farmers have depended upon these fertilizers to

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maintain the fertility of the soil because the steady depletion of soil nutrients through the ages has necessitated the intensive use of all types of organic fertilizers. As a result of the use of organic fertilizers, the farmers of China have been able to maintain relatively high yields compared with those of other countries in Asia. Because of the poor diet of both animals and people in China, the quality of night soil and manure is not good and is particularly lacking in nitrogen. As a result of this poor quality, a larger quantity of organic fertilizers is required to maintain or to raise the yield per hectare than is the case with chemical fertilizers.

Although organic fertilizers are used extensively throughout Communist China and painstaking efforts are made to collect every scrap of waste, there is considerable loss because of improper handling and storage. The government has been acutely aware of this problem, and much emphasis has been placed on improving the methods of collection, handling, and storage. 53/ Because chemical fertilizers will not be available in sufficient quantity to meet agricultural needs of China within the next 10 to 15 years, it will be necessary to increase the supply of organic fertilizers in order to achieve the goals for agricultural production. Under both the First and Second Five Year Plans the local governments and agricultural producer cooperatives are given the responsibility of supplying the bulk of the needed organic fertilizers through the increased breeding of livestock and the planting of green manure crops. 54/

By the end of the First Five Year Plan the increase in the supply of organic fertilizers will make possible an increase in the production of grains of 6 million tons, of which 2.6 million tons probably will consist of rice. Under the Second Five Year Plan the estimated increase in the supply of organic fertilizers will make possible an increase in the production of grains of 9.3 million tons, including 1 million tons of rice.

D. Land Reclamation.

Estimates of the uncultivated arable land in Communist China vary widely, perhaps understandably, because only about 11 percent of the total land area is cultivated. The government claims that there are 100 million hectares of arable land available for cultivation. 55/ This is almost certainly an overstatement because most surveys made in China before the Communists assumed control indicated that there were only about 30 to 50 million hectares which might be reclaimed,

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including 20 million hectares of land suitable for double cropping. According to a survey made in 1940 by the Manchukuo government, Manchuria has a total of 16.4 million hectares of uncultivated arable land. The fertility of this land is low, however, and development would depend upon improvements in the soil. It is claimed that Sinkiang, the other major area under consideration, has 17.5 million hectares of wasteland available for reclamation. 56/ The key factor to the successful cultivation of this land would be irrigation. Smaller areas of reclaimable wasteland are said to exist in many of the traditional agricultural areas of China, primarily in Fukien, Kansu, Kiangsi, Kiangsu, Kwangtung, and Tsinghai. 57/

1. First Five Year Plan (1953-57).

The minimum goal established by the First Five Year Plan for the expansion of the area under cultivation was about 2.6 million hectares. 58/ Most of the reclamation was scheduled to be done by state farms established in areas containing large tracts of wasteland. The means planned for achieving this expansion were the employment of machinery and the resettlement of population from heavily populated areas. The increases in the area under cultivation in Communist China in 1952-57 and that planned for 1962 are shown in Table 4.*

The increase of 2.6 million hectares in the area under cultivation planned for 1957 would represent an increase of less than 2.5 percent more than the area under cultivation in 1952. The Land Utilization Bureau of the Ministry of Agriculture announced in November 1955 that 1.6 million hectares of wasteland had been reclaimed during 1953-55, principally in Heilungkiang. The same report stated that "due to the growth of cooperative farming," the goal for land reclamation by 1957 had been raised from 2.6 million hectares to 5 million hectares. 59/

On the basis of the progress made through 1956, it appears that the area reclaimed by the end of 1957 will be approximately 4.5 million hectares, or 500,000 hectares short of the revised goal of 5 million hectares set by the Five Year Plan. The failure to achieve the revised goal will be due primarily to a shortage in farm machinery and other capital equipment necessary for large-scale land reclamation. It has been estimated that the cost of reclaiming land runs about 600 to 750 yuan per hectare. 60/ The investment of 2.47 billion yuan

* Table 4 follows on p. 16.

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Table 4

Increases in Area Under Cultivation in Communist China
1952-57 and 1962

<u>Year</u>	<u>Area Under Cultivation (Million Hectares)</u>	<u>Increase over 1952 (Million Hectares)</u>	<u>Increase over 1952 (Percent)</u>
1952	107.9 <u>a/</u>	0	0
1953	108.5 <u>a/</u>	0.6	0.6
1954	109.3 <u>a/</u>	1.4	1.3
1955	110.2 <u>b/</u>	2.3	2.1
1956	111.5 <u>c/</u>	3.6	3.3
1957 <u>d/</u>	110.5 <u>e/</u>	2.6	2.4
1957 <u>f/</u>	112.9 <u>g/</u>	5.0	4.6
1957 <u>h/</u>	112.4	4.5	4.2
1962	118.0 <u>i/</u>	10.1	9.4

a. 61/

b. 62/

c. Plan figure. 63/

d. Original Five Year Plan.

e. 64/

f. Revised Plan.

g. 65/

h. Estimate of probable achievement.

i. The Plan indicated an increase of 5 percent over 1957, which was applied to the estimated probable achievement in 1957 rather than to the planned goal for the year.

in agriculture, water conservation, and forestry under the First Five Year Plan probably will not permit the expenditures necessary for large-scale reclamation projects at this time. Progress to date has been due primarily to the intensive efforts of cooperative members on easily accessible land.

Grains will account for approximately 3.8 million hectares of the total increase in the area under cultivation, and cotton probably will account for the remaining 700,000 hectares.

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2. Second Five Year Plan (1958-62).

The Second Five Year Plan calls for an increase in arable land of 5.6 million hectares, a gain of 5 percent over 1957. 66/ No detailed information has been released regarding the amount of capital investment which will be made available for this purpose.

It is estimated that 3.9 million hectares of this increase in arable land will be sown to grains and 1.7 million hectares to cotton.

3. Effects on Production.

Since most of the new land being reclaimed is too far north for double cropping and is of questionable fertility, the yield of grain probably will be no more than 1 ton per hectare. Such a yield would result in a maximum increase in the production of grains of about 3.8 million tons under the First Five Year Plan and 3.9 million tons under the Second Five Year Plan. Increases in the production of cotton due to increased area under cultivation is estimated at 128,000 tons under the First Five Year Plan and 298,000 tons under the Second Five Year Plan.

E. Mechanization.

1. First Five Year Plan (1953-57).

According to the First Five Year Plan, there are to be 290 machine tractor stations with 8,400 tractors* and 141 mechanized state farms with 5,146 tractors, a total of 13,546 tractors, by the end of 1957. 67/ The number of tractors in Communist China, by type of organization, in 1952-57 and the estimated number in 1962 are shown in Table 5.**

Through the end of 1956, all tractors came from the Soviet Bloc, with imports amounting to between 3,000 and 4,000 a year. Imports are expected to increase to at least 5,000 in 1957 and to a higher figure later. 68/

Plans to produce heavier and more complicated equipment such as tractors, reapers, and combines in Communist China are still

* In terms of 15-horsepower units.

** Table 5 follows on p. 18.

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Table 5

Number of Tractors in Communist China, by Type of Organization a/
1952-57 and 1962

<u>Year</u>	<u>On Machine Tractor Stations</u>	<u>On State Farms</u>	<u>Total</u>
1952	0	1,531 <u>b/</u>	1,531
1953	0	1,627 <u>b/</u>	1,627
1954	778 <u>c/</u>	2,235 <u>d/</u>	3,013
1955	2,300 <u>e/</u>	3,012 <u>f/</u>	5,312
1956	6,800 <u>g/</u>	4,392 <u>h/</u>	11,192
1957	8,400 <u>i/</u>	5,146 <u>j/</u>	13,546
1962	N.A.	N.A.	125,000 <u>k/</u>

a. In terms of 15-horsepower units.

b. 69/

c. 70/

d. 71/

e. 72/

f. 73/

g. 74/

h. 75/

i. Plan figure. 76/

j. Plan figure. 77/

k. Estimated. 78/

in an early stage, and the production of these types probably will remain insignificant for the next few years.

Under the First Five Year Plan, mechanization has played a very minor role in agricultural production. By the end of 1956, only 1.3 million hectares, or 1.2 percent of the farmland, in Communist China were cultivated by tractors. 79/

2. Second Five Year Plan (1958-62).

As of the end of 1956, the Chinese Communist leaders had made no commitments as to the goals for mechanization under the Second

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Five Year Plan. Under the Twelve Year Draft National Program for Agriculture, the Minister of Agriculture aimed at mechanizing 47 percent of the total farmland by 1967. The total demand for tractors was placed at 1.2 million to 1.5 million, with replacements at the rate of 120,000 to 130,000 a year. 80/

Such a demand would require a park of 170,000 tractors in 1962 and 450,000 in 1967, entailing the addition of about 60,000 tractors per year. 81/ It appears, however, that the Chinese Communists intend to limit the production of tractors to factories now being built. This policy would cause the production to become stable by 1960 at about 22,500 tractors a year. The result would be a more gradual buildup in the number of tractors from about 11,000 in 1956 to about 75,000 in 1960 and to possibly 125,000 by 1962. 82/

A tractor park of this size might allow as much as 13 percent of the present area under cultivation to be mechanized by 1962. Since new land will be brought under cultivation in the meantime, the percentage of the area to be mechanized will be reduced proportionately. It is doubtful whether more than 10 percent of the area under cultivation will be mechanized by 1962.

A tractor park of 125,000 units would be insufficient to carry out the larger projects for land-development upon which the Draft National Program for Agriculture had depended for significant increases in production. Such projects are unlikely to be undertaken until after the conclusion of the Second or possibly the Third Five Year Plan (1963-67). This is apparently in line with the statement by Chou En-Lai to the Eighth Party Congress, in which he placed little emphasis on mechanization as a means of increasing agricultural production under the Second Five Year Plan.

3. Effects on Production.

Because of the methods of intensive cultivation employed by the Chinese farmer, it is highly unlikely that mechanization will improve the yields of crops, although the productivity of labor may be raised. Until the surplus manpower in the rural areas of Communist China can be absorbed by industry and other occupations, however, savings in labor will not be significant. In any event, the cultivation of rice does not lend itself readily to mechanization. In growing wheat, coarse grains, and vegetables, machinery can be utilized more effectively. Manchuria, Northwest China, and the North China plain are suited to a high degree of mechanization.

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F. Modern Farm Implements.

The provision of better hand-drawn and horse-drawn implements probably is more important to the Chinese Communists than is mechanization. Because of the clumsy and crude farm tools used, the working efficiency of Chinese human and animal labor is low. The primitive plow used by the farmer and his ancestors for decades does slow work and does not plow deeply or break the earth properly. A supply of modern hand tools and animal-drawn or mechanical implements is essential. The government is aware of this problem and is striving to increase the production of modern agricultural implements. Requirements for 1956 and 1957 placed a heavy strain on the comparatively underdeveloped agricultural equipment industry of Communist China, and it will be some years before the type of equipment needed can be produced in anything approaching adequate quantities.

The plan for this industry in 1956, as originally announced, called for the production of about 3.5 million animal-drawn and man-powered implements of 10 standard types, together with a large number of hand tools of 60 improved designs. 83/ Before the end of 1955, however, the decision to accelerate the tempo of agricultural development necessitated a considerable upward revision of these goals. The industry was called upon to produce 5 million plows in 1956, mainly of the double-furrow type, as well as 1 million lighter plows; 70,000 harrows; 110,000 sowing, threshing, and other similar machines; and 860,000 water-raising wheels. 84/ In June 1956, plans for the production of plows were revised downward, however, to 2.5 million units, reportedly because of shortages in the supply of steel. 85/

The Chinese Communist press has devoted much editorial space to reports of production of the "two-wheeled, double-bladed plow" and the "two-wheeled, single-bladed plow." Most of the new plows delivered in 1955 arrived in the latter part of the year and were not available in appreciable numbers at plowing time. The most recent claims indicate that production in 1955 amounted to less than 800,000 plows, of which fewer than 438,000 were reported to have reached the prospective users. 86/

Although state-operated factories throughout Communist China are producing two-wheeled plows* and the use of these plows is encouraged by the government, adequate draft power has not been available in many instances. The two-wheeled plow has the advantages of

* Including both single-bladed and double-bladed types.

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plowing deeply, breaking up the earth properly, and working at a good rate. On the other hand, stronger draft power is necessary. The strength and numbers of present breeds of livestock have not been suitable. Two to three work animals are necessary to pull this type of plow. Unless the vitality of the work animals is improved and unless their numbers are increased, the rapid utilization of modern implements cannot be expected. In an attempt to improve this situation, the government is striving to increase the number of draft animals, but the program has proceeded very slowly. The number of draft animals in 1955 was only 2.8 percent greater than in 1954, and the number in 1956 was only 0.2 percent greater than in 1955. 87/

The two-wheeled plow not only has inadequate draft power but is complicated to assemble and cannot be used on hilly or irrigated fields. Moreover, most farmers do not know how to use the plow. Finally, spare parts are not generally available. 88/

It is claimed that deep plowing can increase yields by 10 percent. Until modern implements are made generally available, however, along with sufficient draft power, only a slight increase in yields can be expected by 1962.

G. Control of Pests and Plant Diseases.

Communist China has suffered continually from agricultural losses caused by pests and plant diseases which have resulted in famines every year in many areas. It has been estimated that the annual loss caused by pests and plant diseases averages about 20 percent of the grain crops and about 30 percent of the cotton crop.

The only definite long-range program announced by the Chinese Communists for the control of plant pests and diseases was described in the Twelve Year Draft National Program for Agriculture. This Plan called for the elimination of pests and plant diseases by 1967, starting with a drive to exterminate rats, sparrows, flies, and mosquitoes.

In 1956 the state planned to set up 118 stations to report and forecast the incidence of pests and plant diseases as well as 4,000 to 5,000 Pest and Disease Intelligence Points and 1,200 Basic Level Pest and Disease Extermination Centers. 89/ Soviet technical advice has been sought, and the USSR has helped with the spraying of insecticides from aircraft.

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The success of any program for controlling pests and plant diseases depends largely upon the supply of insecticides and fungicides. More than 500,000 tons of insecticides were supplied in 1956, but this amount averages only about 1 ton per 200 hectares. There is plenty of raw material for the production of fungicides, but it is questionable whether the government is prepared to organize industrial capacity on a sufficiently large scale.

It is impossible to achieve the goal of eradicating all the pests and plant diseases in Communist China in 12 years. The loss of grains might be reduced, however, by 5 to 10 percent over this period, and the loss of cotton by about 25 to 50 percent.

H. Improved Varieties of Seeds.

The Chinese Communists are taking a keen interest in the breeding of plants and are planning to distribute selected seeds throughout the country. It was claimed that 12.5 million hectares, one-eighth of the area devoted to grains, would be sown to selected seeds in 1956 and that 2 million hectares would be sown to selected cotton seed. 90/

Any increase in production resulting from improved varieties of seeds will not be significant. The effects of new varieties generally result in qualitative improvements. To the extent that new varieties increase the resistance of plants to disease and thereby reduce losses, increases in production can be achieved. No improvements, either quantitative or qualitative, can be achieved, however, until such new varieties are distributed to the farmers throughout Communist China in sufficient quantities to replace the old varieties.

V. Prospects for Increasing Production.

Estimated increases in the production of grains and cotton resulting from measures to increase production in Communist China in 1953-62 are shown in Table 6.* Barring natural calamities and assuming average weather conditions, the special measures taken to improve agricultural production in Communist China probably will serve to increase the production of grain by 21.7 million tons under the First Five Year Plan and by 32.2 million tons under the Second Five Year Plan. Such increases would raise the production of grains to

* Table 6 follows on p. 23.

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Table 6

Estimated Increases in the Production of Grains and Cotton
 Resulting from Measures to Increase Production
 in Communist China a/*
 1953-62

Measure to Increase Production	Thousand Metric Tons			
	Rice	Other Grains	Total Grains	Cotton
First Five Year Plan (1953-57)				
Irrigation	5,000	300	5,300	127
Fertilizers				
Chemical	4,400	200	4,600	75
Organic	2,600	3,400	6,000	0
Land reclamation and mechanization <u>b</u> /	0	3,800	3,800	128
Miscellaneous <u>c</u> /	0	2,000	2,000	0
Total	<u>12,000</u>	<u>9,700</u>	<u>21,700</u>	<u>330</u>
Second Five Year Plan (1958-62)				
Irrigation	10,000	300	10,300	291
Fertilizers				
Chemical	4,000	1,700	5,700	176
Organic	1,000	8,300	9,300	0
Land reclamation and mechanization <u>b</u> /	0	3,900	3,900	398
Miscellaneous <u>c</u> /	0	3,000	3,000	0
Total	<u>15,000</u>	<u>17,200</u>	<u>32,200</u>	<u>765</u>
Grand total	<u>27,000</u>	<u>26,900</u>	<u>53,900</u>	<u>1,095</u>

* Footnotes for Table 6 follow on p. 24.

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Table 6

Estimated Increases in the Production of Grains and Cotton
Resulting from Measures to Increase Production
in Communist China ^{a/}
1953-62
(Continued)

a. These estimates were derived by a complex methodology, impractical to reproduce here.

50X1
50X1

- b. Mechanization was computed as an input to land reclamation.
c. Including farm implements, control of pests and plant diseases, and improved varieties of seeds.

185.6 million tons in 1957, or 96 percent of the goal of the First Five Year Plan, and 217.8 million tons by 1962, or 87 percent of the goal of the Second Five Year Plan.

The measures to increase agricultural production discussed above would also make possible an increase in the production of cotton of 330,000 tons under the First Five Year Plan and 765,000 tons under the Second Five Year Plan. Such increases would result in the fulfillment of the goals for the production of cotton of 1.6 million tons in 1957 and 2.4 million tons in 1962. A comparison of reported and planned production of grains and cotton with probable production of grains and cotton in Communist China in 1952-57 and 1962 is shown in Table 7.*

VI. Conclusions.

Regardless of official enthusiasm regarding the program for socialization and the measures to increase agricultural production, it appears doubtful whether the Chinese Communists can achieve their planned goals for the production of grains. Increases in the production of grains will fall short of the goals of the First Five Year Plan and still further short of the goals of the Second Five Year Plan. On the other hand, the goals for the production of cotton probably will be attained.

* Table 7 follows on p. 25.

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Table 7

Reported, Planned, and Probable Production
of Grains and Cotton in Communist China
1952-57 and 1962

Year	Thousand Metric Tons			
	Reported Production <u>a/</u>		Probable Production <u>b/</u>	
	Grains	Cotton	Grains	Cotton
1952	163,900	1,305	163,900	1,305
1953	166,800	1,175	166,000	1,175
1954	168,800	1,065	164,000	1,065
1955	184,000	1,518	180,000	1,518
1956	192,000	1,460	180,000	1,460
1957	192,800 <u>c/</u>	1,635 <u>c/</u>	185,600	1,635
1962	250,000 <u>c/</u>	2,400 <u>c/</u>	217,800	2,400

a. 91/

b. See Table 6, p. 23, above.

c. Plan figure.

The success achieved thus far in increasing agricultural production in Communist China has resulted primarily from the adoption of the easiest measures, such as local projects, without investing adequate capital in materials, such as chemical fertilizers, which will be essential later. The lack of sufficient chemical fertilizers is the primary reason for the probable failure to achieve the goals of the Second Five Year Plan for the production of grains.

Mao Tze-tung emphasized that the basic premise of the Chinese Communists in undertaking the collectivization of agriculture and in intensifying efforts to increase agricultural production through the cooperatives was to expand both the proportions and the absolute amounts of grains and technical crops passing through state trading channels in order to support the program for industrialization. It is clear that the progress made toward socialization in 1956 is an important step in achieving increased control over agriculture.

The new emphasis on rapidly extending socialization in order to enforce the adoption of measures for increasing production, as well

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as for maximizing agricultural procurement, may result in substantial progress toward the realization of Chinese Communist goals. It will require a number of years, however, to gauge effectively the success of the program for socialization, and in evaluating the results it will be difficult to separate the effects of socialization upon agricultural production from such natural factors as weather. In any event, the achievement of significant increases in agricultural production will depend primarily upon the extent to which the government is willing to invest in the program, particularly on the extent of the investment in chemical nitrogenous fertilizers.

The increases in the production of grain through the end of the Second Five Year Plan should be sufficient to maintain the supply of food per capita at present levels of consumption. After 1962, however, unless production can be increased at a rate which equals or exceeds the rate of growth in population, which is now 1.5 to 2 percent per year, Communist China may be forced to become a net importer of food.

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