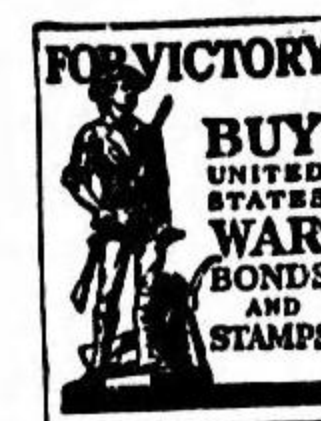




WAR DEPARTMENT  
UNITED STATES STRATEGIC BOMBING SURVEY



Oil and Chemical Division  
231 Sansome Street  
San Francisco, California

February 28, 1946

MAJOR H. J. RUGO - MEDICAL DIVISION  
United States Strategic Bombing Survey  
Gravelly Point - Rm. 2314  
Washington, 25, D. C.

Dear Major Rugo:

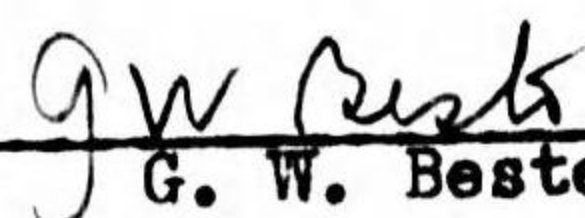
Dr. Spaght has handed to me for comment page 18 (paragraph 3), entitled "Effect of Bombing on Fertilizers," of your report draft entitled "Chairman's Summary (Medical Division)."

My principal comment concerns your implication that bombing of the producing plants caused the decline in output. While this effect of bombing was very important in the final months of the war it was less important overall than the indirect effects of war such as the supply of spare parts and the availability of labor. Production of ammonium sulfate fell 50 per cent and calcium cyanamide 30 per cent before bombs fell on the plants.

Superphosphate production was limited not by the number of plants but by the supply of imported phosphorus rock. Imports fell steadily from 1,200,000 short tons in 1940 to 200,000 in 1944.

The number of plants of each type given in your report is not entirely consistent with the information given us by the Chemical Industries Control Association. According to this source the number of plants of each type in the Home Islands was as follows: Calcium cyanamide 8, superphosphate 28, synthetic ammonium sulfate 15, by-product ammonium sulfate (normally accounting for less than 10 per cent of the total ammonium sulfate output) 27.

Yours very truly,

  
G. W. Beste

126-2-504





	<u>M.W.</u>
$\text{CaCN}_2$	80.11
$(\text{NH}_4)_2\text{SO}_4$	132.14
$\text{N}_2$	28

$$\frac{132}{28} = 4.714$$

$$\frac{80}{28} = 2.857$$

---

Check w/ MFC Div.



## Correlation w/ Chem Div. Tables

### Calcium cyanamide (Production)

	Table 10.	Table 2.	Factor	
1940	2,334,877	49,163	4.749	$\frac{80}{28} = 2.857$
1941	2,507,779	52,690	4.759	
1942	2,114,888	44,312	4.773	$\frac{80}{14} = 5.714 \checkmark$
1943	1,698,223	35,714	4.755	"nitrogen" is N
1944	1,634,451	34,281	4.768	
1945	40,809	6,393	6.383	

(tons as  $\text{CaCN}_2$ ) (tons as  $\text{N or } \text{N}_2$ )

### Ammonium sulfate (Imports)

1940	1,285,554	26,483	4.854	
1941	605,111	12,464	4.855	$\frac{132}{28} = 4.714 \checkmark$
1942	348,334	7,176	4.854	"nitrogen" is $\text{N}_2$
1943	0	0	?	$\frac{132}{14} = 9.428$
1944	1,034	213	4.854	
1945	0	0	?	

[tons as  $(\text{NH}_4)_2\text{SO}_4$ ] (tons as  $\text{N or } \text{N}_2$ )

### Phosphorite (Imports) from Table 54, Fertilizer Section (1,000 tons)

Fertilizer + Agric. Bureau  
Min. of Agric. + Forestry.

1939	1,217
1940	1,122
1941	787
1942	515
1943	367
1944	161

### Superphosphates (tons)

Chemical Industry Central Assoc.  
(Table 55.)

	Production	Consumption
1940	1,846,800	1,288,600
1941	1,058,800	776,000
1942	671,900	745,200
1943	515,700	440,900
1944	56,800	15,400
1945	8,200	—

(Apr. - Aug.)



TABLE "2" NITROGEN BALANCE FOR THE HOME ISLANDS  
(figures are tons of nitrogen for periods indicated)

PRODUCTION OF NITROGEN									
FISCAL YEAR	QUARTER	SYNTHETIC AMMONIA	PER CENT	CALCIUM CYANAMIDE	PER CENT	BY-PRODUCT AMMONIA	PER CENT	IMPORTS AMMONIUM SULFATE ONLY	PER CENT
1940		309,516	76.0	49,163	12.1	22,216	5.4	26,483	6.5
1941		341,016	79.5	52,690	12.3	22,856	5.3	12,464	2.9
1942		306,275	80.5	44,312	11.7	22,436	5.9	7,176	1.9
1943		269,902	84.3	35,714	11.1	14,784	4.6	0	0.0
1944		198,400	81.0	34,281	14.0	12,098	4.9	213	0.1
1945	thru June	24,685	73.9	6,393	19.1	2,324	7.0	0	0.0

DOMESTIC CONSUMPTION OF NITROGEN					
FISCAL YEAR	QUARTER	AMMONIUM SULFATE	PER CENT	CALCIUM CYANAMIDE	PER CENT
1940		257,983	63.3	48,502	11.9
1941		283,348	66.2	51,148	12.0
1942		246,995	65.0	42,217	11.1
1943		210,420	65.8	37,587	11.7
1944		140,255	57.2	27,778	11.2
1945	thru June	15,658	46.9	6,173	18.5

TABLE "10" PRODUCTION, IMPORTS AND EXPORTS OF AMMONIUM SULFATE AND CALCIUM CYANAMIDE FOR THE HOME ISLANDS  
(figures are tons for periods indicated)

FISCAL YEAR	QUARTER	AMMONIUM PRODUCTION	SULFATE* IMPORTS	CALCIUM PRODUCTION	CYANAMIDE EXPORTS
1940		1,252,400	128,554	233,487	7
1941		1,374,000	60,511	250,779	0
1942		1,189,300	34,834	211,488	1
1943		1,012,400	0	169,823	0
1944		680,900	1,034	163,451	0
1945	Apr.-Aug.	92,100	0	40,809	.....

\* Includes by-product ammonium sulfate.



P.	1,010,000 150,000	1,130,000 240,000	1,240,000 240,000	1,040,000 160,000	860,000 160,000	410,000 100,000
C.	1,100,000 180,000	1,180,000 200,000	1,200,000 220,000	1,000,000 170,000	820,000 160,000	(413,000) 440,000 (107,000) 120,000
	1940	1941	1942	1943	1944	1945 (estd)



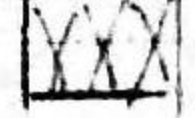
from: SCAP graphs

{ figures in ( ) are for  
year Aug - July  
∴ accurate }

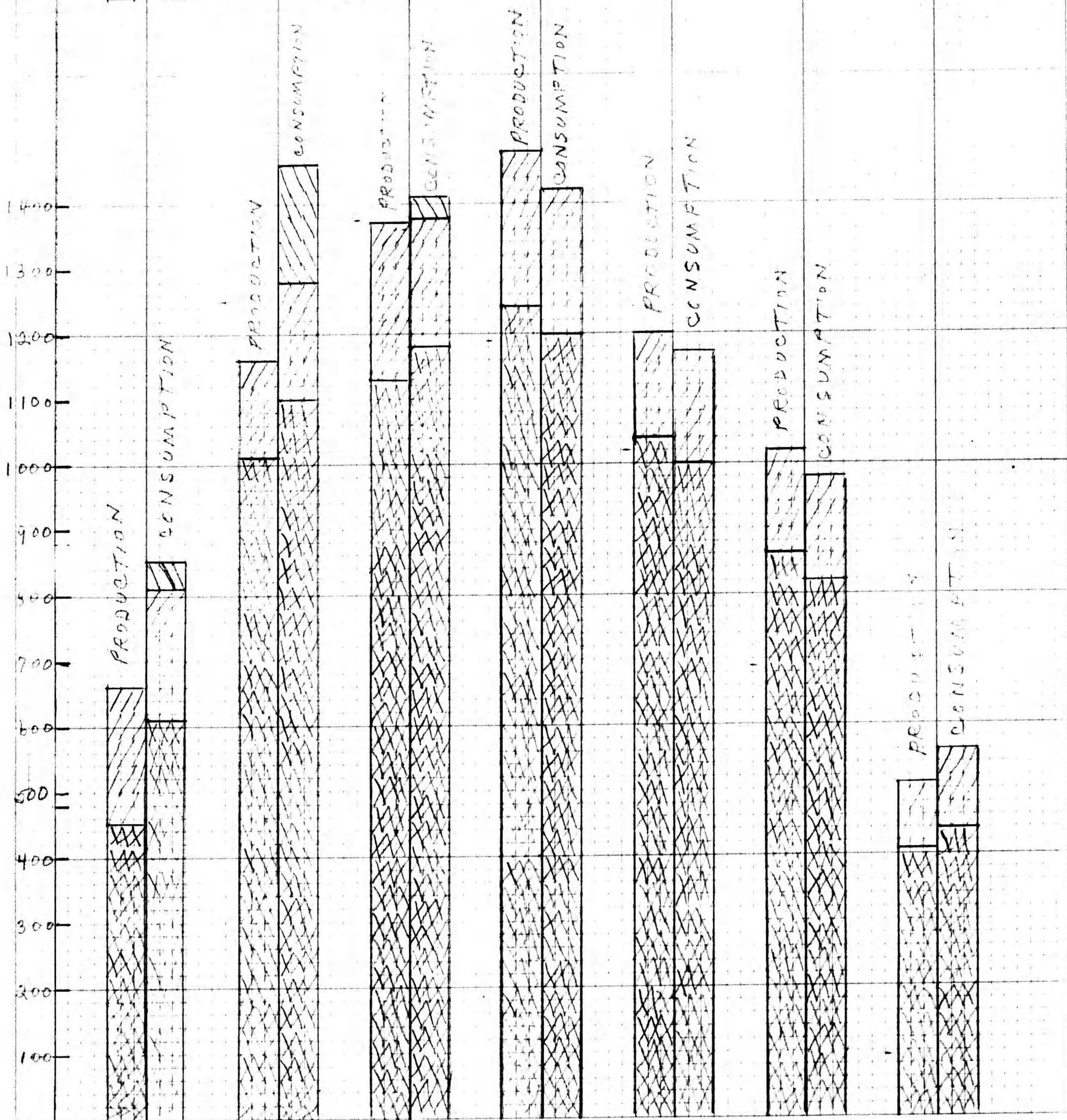


# PRODUCTION AND CONSUMPTION OF SYNTHETIC NITROGEN FERTILIZERS IN JAPAN PROPER

(IN 1000 METRIC TONS)

 SODIUM NITRATE  
 CALCIUM CYANAMIDE  
 AMMONIUM SULPHATE

Line Series



AVE. 1930-35

1940

40/41

42

43



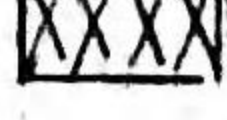
44

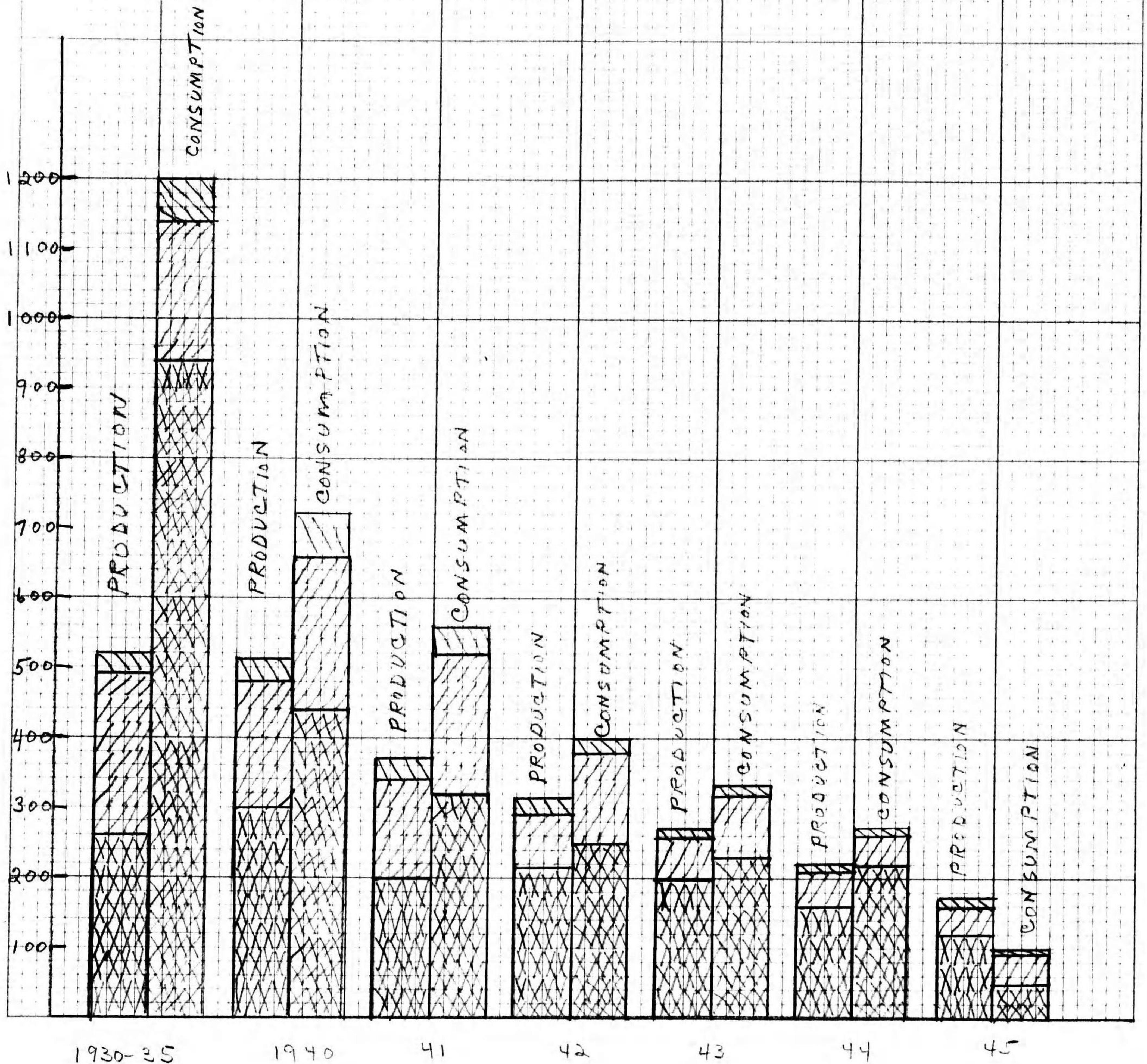
45

FINANCIAL YEAR (APRIL - MARCH)



# PRODUCTION AND CONSUMPTION OF ORGANIC FERTILIZERS IN JAPAN PROPER (IN 1000 METRIC TONS)

 BONE MEAL  
 FISH MEAL  
 SOYBEAN OIL CAKE



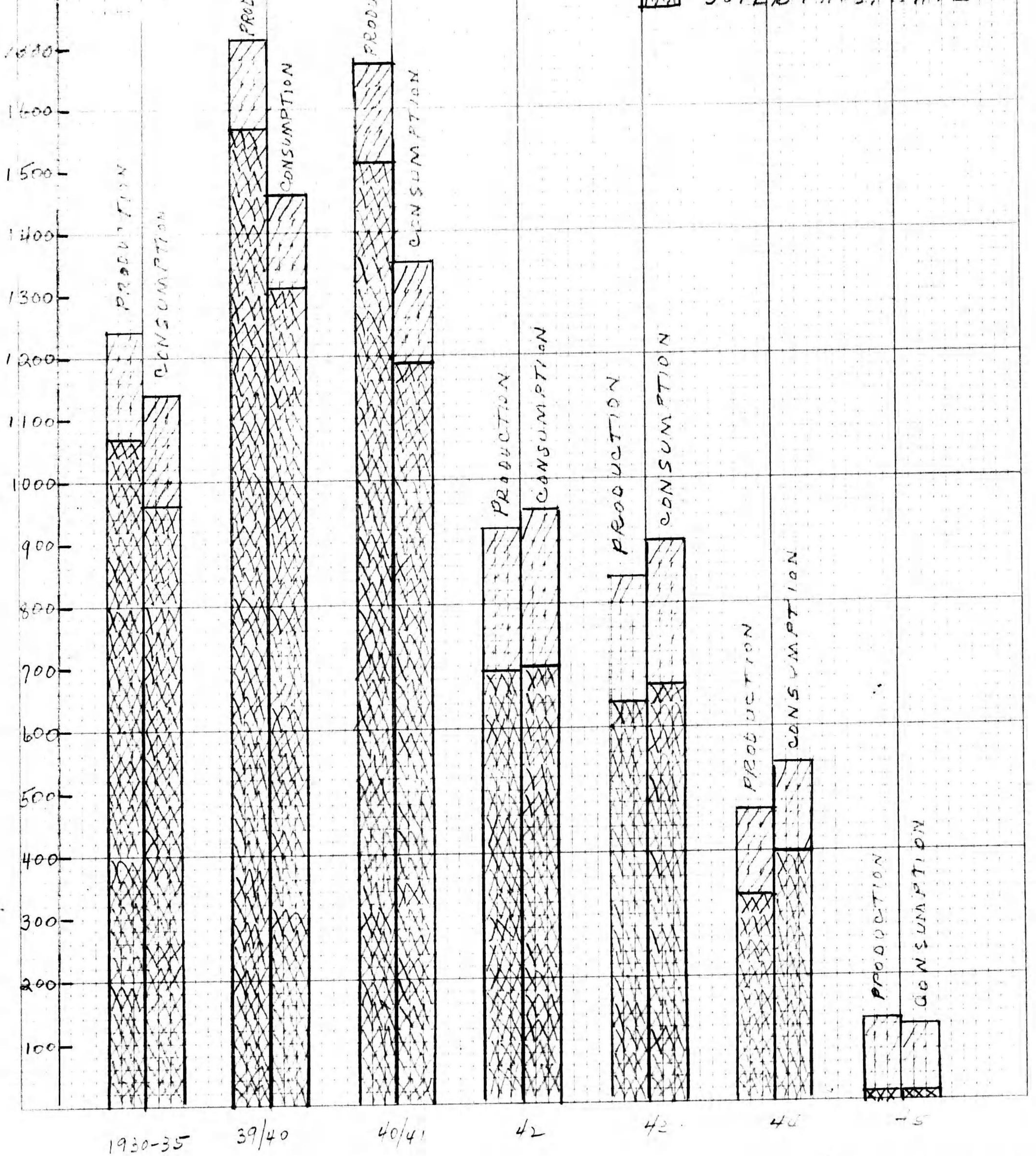


EUGENE DIEZEL CO. INC. NO. 345

# PRODUCTION AND CONSUMPTION OF PHOSPHATIC FERTILIZERS IN JAPAN PROPER

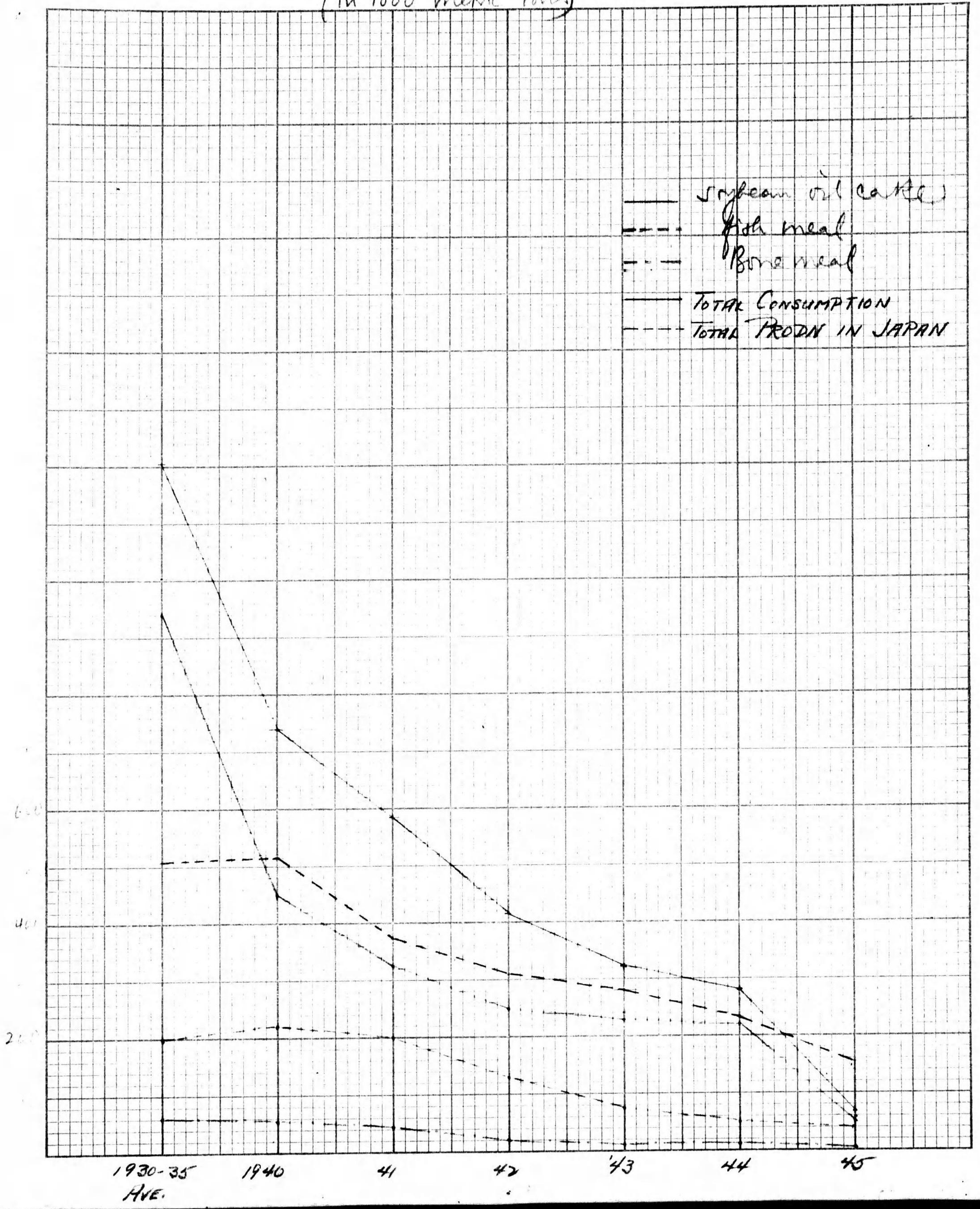
(IN 1000 METRIC TONS)

SYNTHESIZED PHOSPHATES  
 SUPER PHOSPHATE



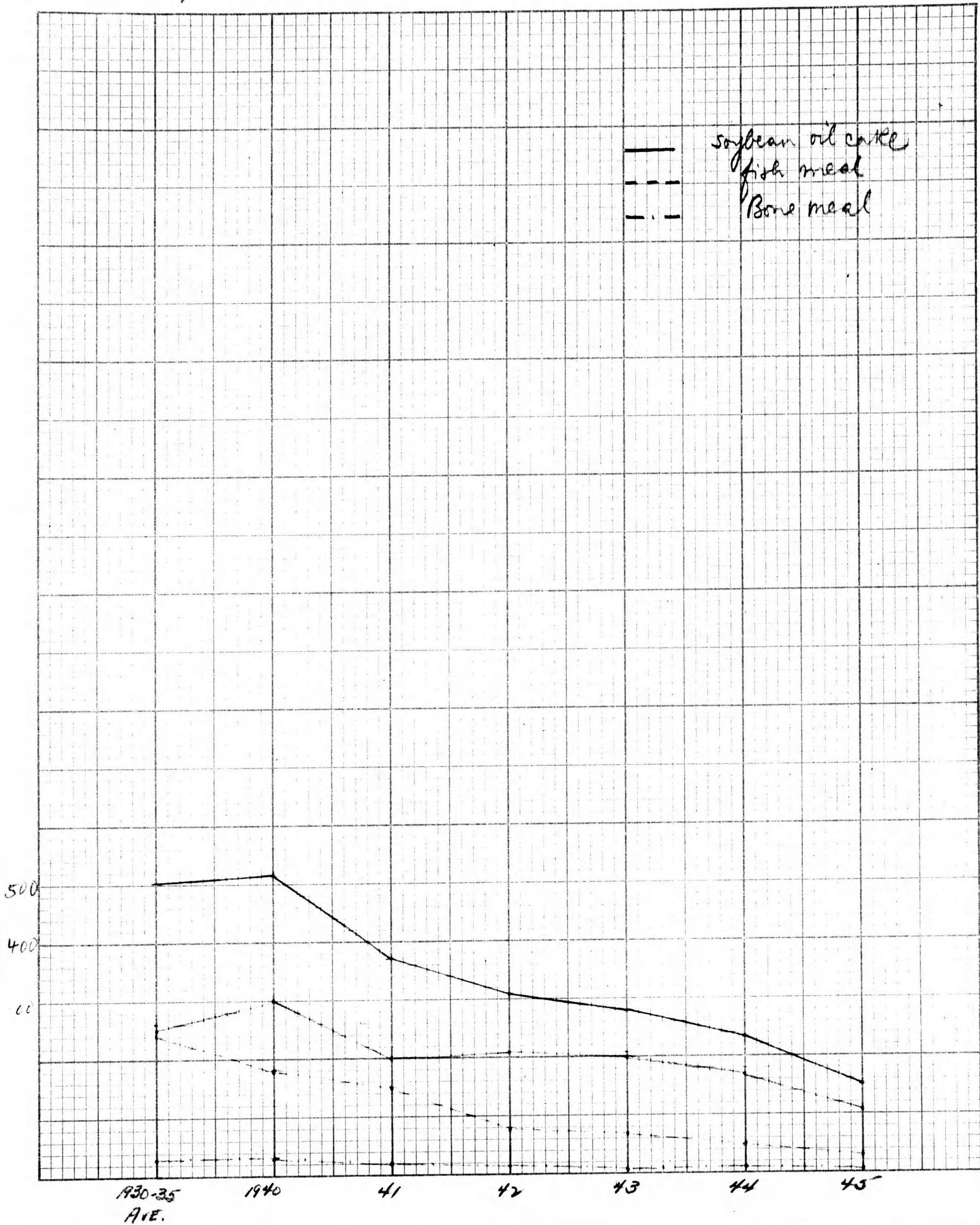


Organic fertilizers in Japan proper  
 (in 1000 metric tons)



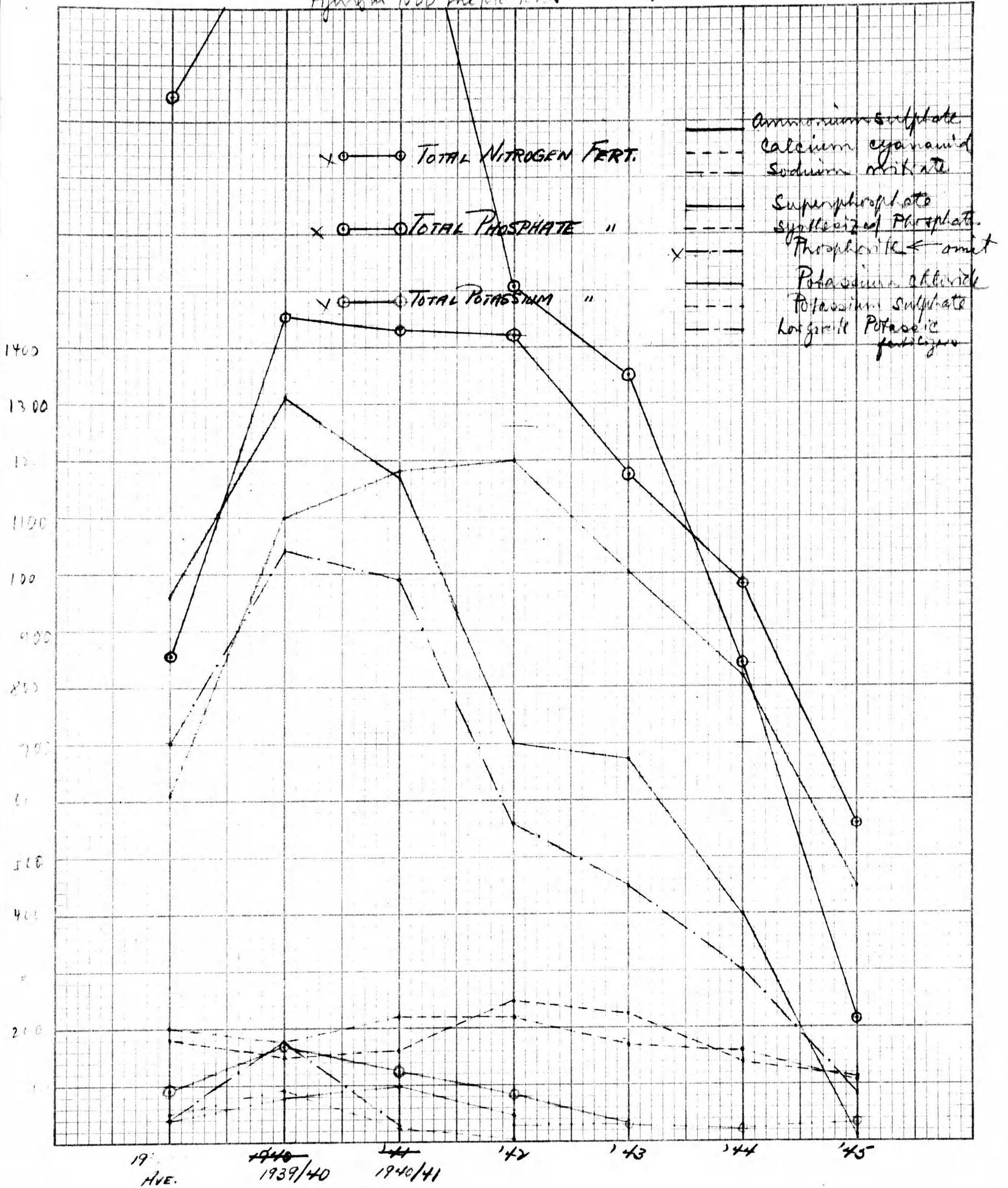


Production of fertilizers in Japan proper





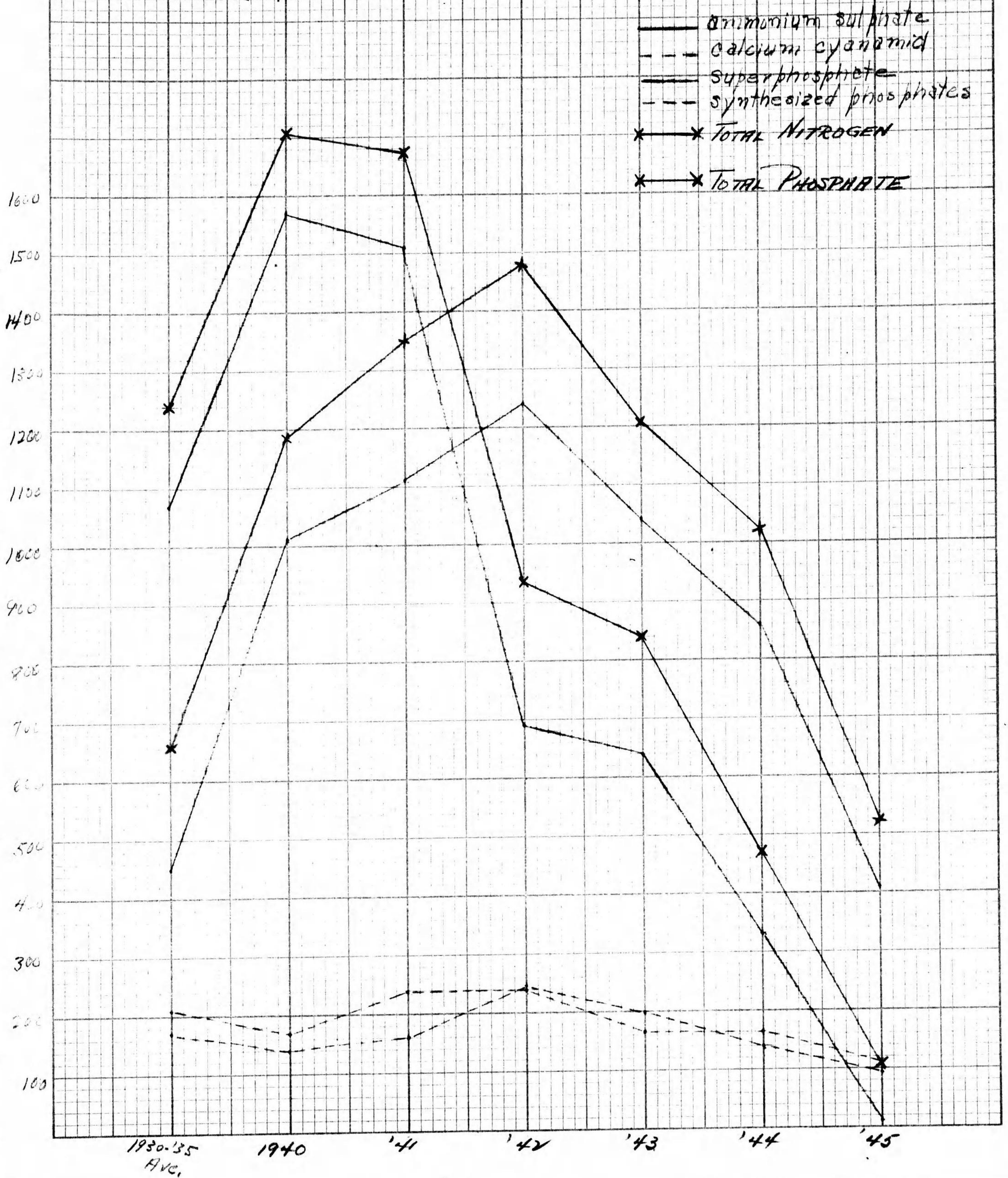
Fertilizer in Japan proper 1930-44  
 Figures in 1000 metric tons





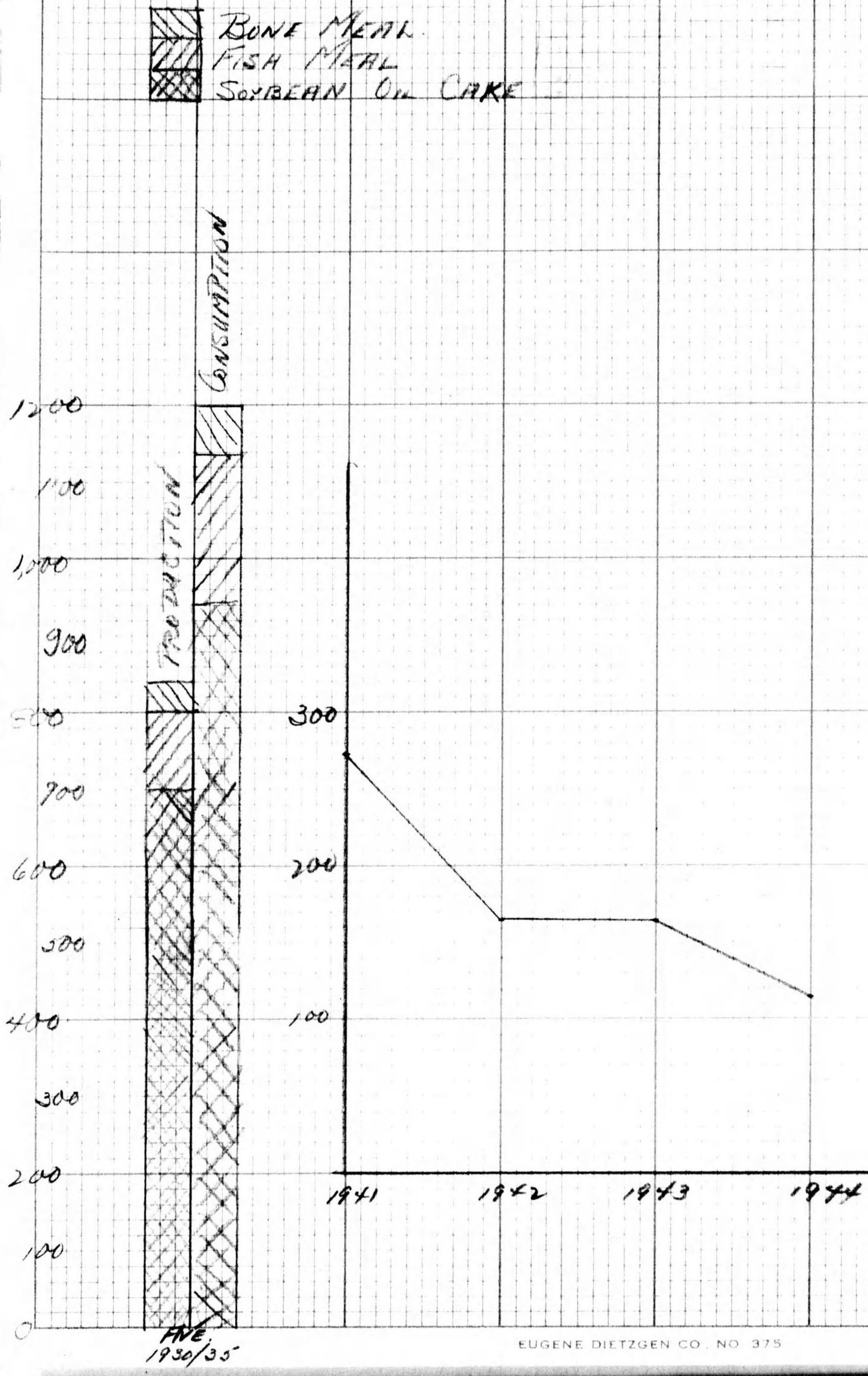
# Fertilizer Chart. - Production of Chemical Commercial Fertilizers in Japan Proper

(Figures in 1000 metric tons)





# PRODUCTION AND CONSUMPTION OF ORGANIC FERTILIZERS IN JAPAN PROPER (IN 1000 METRIC TONS)





Natural Resources  
Sect.  
SCAP.

# Annual Production of Calcium Cyanamide

		1941/42?	1942/43?	1943/44?	1944/45?
Tohoku Denki Seiteku KK	Wakagawa	3306	932	-	-
Shima Denko KK	Kanose	53624	33349	35697	24248
Shinetsu Kagaku Kogyo KK	Naoetsu	27543	23075	20924	15320
Denki Kagaku Kogyo KK	Aomi	74170	55410	58668	37216
Nihon Kabaido Kogyo KK	Uozu	13175	11967	11495	9180
Daido Kagaku Kogyo KK	Tatefu	-	2742	1932	✓ 1747
Ebizawa Denki Kogyo KK	Nishiozaki	673	1307	2050	1410
Denki Kagaku Kogyo KK	Omuta	<u>49375</u>	<u>35814</u>	<u>32910</u>	<u>✓ 25210</u>
	Annual total	271,241	164,536	163,676	114,331
	Ave. monthly total	22,603	13,711	13,639	9,527

4880  
↑  
51.2% loss  
in monthly cap.



Calcium cyanamide Plants

damaged by bombing

	<u>Monthly capacity</u>	<u>Nov's prodn.</u>
Saido Kagaku K.K. Takifu	1580	300
Senri Kagaku K.K. Omuta	<u>5000</u>	<u>1400</u>
	6580	1700

25.8% of cap. remaining

6580  
1700  
4880 Loss in monthly cap.



# Superphosphate Plants damaged by bombing.

	<u>Monthly capacity</u>	<u>Estimated NOV prodn.</u>	<u>Damage</u>
Nippon Hiryu KK, Kushiro	3500	—	—
Nissan Kagaku KK, Hokodate	4800	—	—
" , Oji	10,700	1700	slight
" , Komatsugawa	8,300	—	✓
Nippon Kokan KK, Kawasaki	8300	—	✓
" , Kojasu	3300	—	✓
Ishihara Sangyo KK, Yokkaichi	6400	1000	✓
Toa Kasei KK, Osaka	4800	—	slight
Tajiri Seishisetsu KK, Beifu	16,600	700	✓
	<u>66,700</u>	<u>3,400</u>	
	8,300		
	<u>58,400</u>		



# Present condition of Ammonium Sulphate Plants

<u>Name of Co</u>	<u>Name of plant</u>	<u>Pre-war monthly capacity</u>	<u>Estimated Prod. in Nov. 1945</u>	<u>Present condition</u>
1) Toyo Katsen	Hokkaido	4167 m.t.	—	Begin operation in Dec
2) Nitto Kagaku Kogyo K.K.	Hachinoe	4167	—	✓ Bombed
3) Tohoku Hiryo K.K.	Akita	2833	600	NOT bombed
4) Showa Denko K.K.	Kawasaki	17.833	—	✓ Heavily damaged
5) Nitto Kagaku Kogyo K.K.	Yokohama	1500	700	NOT bombed
6) Nissan Kagaku Kogyo K.K.	Toyama	11.333	6500	NOT bombed
7) Toa Josai Kagaku Kogyo	Nagoya	4917	1500	✓ Light damage
8) Sumitomo Taiyokagaku Kogyo K.K.	Beppu	2417	300	NOT bombed
9) " "	Niihama	14.917	4000	NOT bombed
10) Ube Kasei K.K.	Ube Tisso	13.250	1000	✓ Considerable damage
11) Toyo Kasei K.K.	Hikashima	1083	300	NOT bombed
12) Mitsubishi Kasei Kogyo K.K.	Kurosaki	1767	1000	"



12) Toyo Katsen Kogyo KK	Osaka	18,833	—	✓ heavily damaged
14) Nihon Tisso Hiryo KK	Minamata	4,167	2,000	✓ damaged
15) Nittitsu Kagaku Kogyo KK	Nobeoka	4,083	—	✓ "
		<hr/>	<hr/>	
		111,167	17,900	

∴ ∑ Annual cap. 1,334,004

62,750 T. of monthly cap. destroyed by bombing.  
 ↑ 56.4%

∑ Monthly cap. of ~~bombing~~ plants hit by bombs.  
 is 67,250 Tons = 60.5% of total  
 prodn. cap. (pre-war).



# Annual production of Ammonium Sulphate

	<u>1941/42</u>	<u>1942/43</u>	<u>1943/44</u>	<u>1944/45</u>
1)	-	-	-	-
2)	40069	36490	25968	16896
3)	26258	13342	18869	5192
4)	176.004	171.817	152.752	61943
5)	23689	29965	18067	9830
6)	97883	89459	84009	72034
7)	46890	44319	29552	8662
8)	13463	11726	3747	6640
9)	145.916	120.588	108.615	45864
10)	164.282	136.194	109.905	57180
11)	2684	2350	5946	5138
12)	59553	52962	34638	3245
13)	185.390	133.034	96357	33001
14)	40910	32082	35008	25913
15)	17185	16543	16590	8132
	<hr/>	<hr/>	<hr/>	<hr/>
	1,040,176	890,871	740,023	359,670

34.6% of 1941



first  $\text{NH}_3$  plant damaged '30 June '45

(Apr - Mar Fert. Year)

$\Sigma$  designed cap. / mo. 42,070

$\Sigma$  max. actual prodn 37,421

$\Sigma$  1941 mean mo. 31,300

1942 28,155

1943 25,370

1944 18,405

1945/4 10,406

15 9,039

One source, but agrees w/ others

16 7,780

17 4,165

18 1,571

Bureau of Munitions

Inorg. Chem. Sect

Mr. Tsuda



<u>Name of plant</u>	<u>Location</u>	<u>Prefecture</u>	<u>Product and Capacity</u>	<u>Pre-war production</u>	<u>Post war production</u>	<u>% of capacity</u>
Nissan Chemical Industrial Co Ltd	Neigun	Toyama	Ammonium sulphate 189000 to Synthetic fertilizer 36000 to	143000 to  28800 to		2.
Japan Nitrogen Fertilizer Co, Ltd, Minamata Factory	Hama	Kumamoto	Ammonium sulphate			83
Japan Carbide Industrial Co, Ltd	Shimo-shinbawa	Toyama	Calcium cyanamide 12000 to			0
Electro-chemical Industrial Comp. Aomi - Works	Aomi	Niigata	Calcium cyanamide 35000 to			0
Omuta Works	Omuta	Fukuoka	Calcium cyanamide 25000 to			40
Nitto Kagaku Kogyo Co, Ltd	Yokohama		Ammonium sulphate 7000 to			0
Hokkaido Factory Co, Toyokoatsukogyo	?		Ammonium sulphate 60000 to			2.
Sumitomo Chemical Co, Ltd	Osaka		Ammon. sulphate 160000 to			6
Kureha Chemical Industry Co, Ltd, Nishiki Factory	Nakata	Fukushima	phosphatic fertilizer 36000 to			0.3



The Taki Fertilizer Manufacturing Co, Ltd	Kato-Gun	Hyogo	Calcium superphosphate 180000 to Compound fertilizer 18000 to	0
Ube Kozan Co Ltd	Ube	Yamaguchi	Sulfate ammonia 120000 to	20
The Toa Synthetic Chemical Co	Nagoya		Sulfate ammonium 110000 to	7
* Kureha Chemical Industry Co Ltd, Nishiki Factory	Nakata	Fukushima	Compound fertilizer 24000 to Aluminium sulphate 600 to	0.3



**Nagasaki Ken**

Population 1940 (including armed forces) 1,370,063  
Population 1945 (excluding armed forces) 1,264,000 (estimate)

Nagasaki-shi 252,630

Food per capita - 2150 calories - slight deficit in the ken. Largest total production coastal fishing in southwest Japan.

Nagasaki-shi - Water supply & distribution

1940 Population served - 176,000

per cent 78.2

per capita con. 29 gal.

Purity raw water 5560 bact. colonies per cc

Finished water Max. 70 - Minimum 8

Typhoid epidemic 1931

Sewage - Nagasaki no underground given for 1940

Night soil collection 1937 - 38,473 houses served

Health & Sanitation - authority prefectural governor

Health Section assisted by police

Sanitation, epidemic disease control, chronic disease control, collection of vital statistics, medical care

Modern hospital facilities - ration physicians 6.8 per 10,000

3 hospitals (public) bed capacity 124

43 private hospitals bed capacity 1,360

Omura Health Center

(1938) 4 mental hospitals

Doctors 742

Dentists 361

Pharmacists 413

Veterenarians 175

Mid-wives 1195

Nurses 1483



Leading causes of death:

Pneumonia 223.1

Tuberculosis 192.9

Senility 181.9

Cerebral Hemmorage 153.3

Diseases of early infancy 109.4

Nephritis 92.1

Diarrhea & enteritis (under 1) 73.8

" " (over 1) 62.4

Heart 69.8

Cancer 62.8

Eriki 21.5

Beri beri 20.9

1938 Birth rate Nagasaki Ken 28.4

Death rate Nagasaki Ken 18.9

835 Photo.



Major Rugo

7 November 1945

Interview of Takubo Shingo, Assistant Chief of the Hiroshima Food Office

Plan for Emergency Feeding.

The police of the towns of Kaitaichi, Hatsuokaichi, and Kabe, eight kilometers east, twelve kilometers southwest, and twenty kilometers north, of Hiroshima, respectively, were standing by to supply two day's rations for bombed-out civilians in case of emergency. After the atomic bomb raid this plan supplied the first two day's rations of 330 grams of cooked rice and three pickled plums per day. Biscuits were used in place of rice to supply isolated individuals when transport was difficult. After the second day the city obtained food from army stocks which was distributed by the police. After the seventh day food was issued through the normal rationing organizations.

The emergency stores set up by the city in outlying districts of canned fish, pork and beans, etc., were used for rationing after the seventh day and the supply of fresh vegetables from farmers was organized later. Stores of rice in the hands of farmers' cooperatives were considered to be on call by the city to their total extent. At the time of the atomic bomb raid this would have amounted to approximately three month's supply to the new rice harvest.

Evidence of Malnutrition.

Interrogated official considered the normal ration of 440 grams of rice per day not to be inadequate. His only observation of abnormal conditions was the longer time of recovery of many people who were ill. He also felt that sedentary workers would be able to continue indefinitely on a normal ration.

-----end-----