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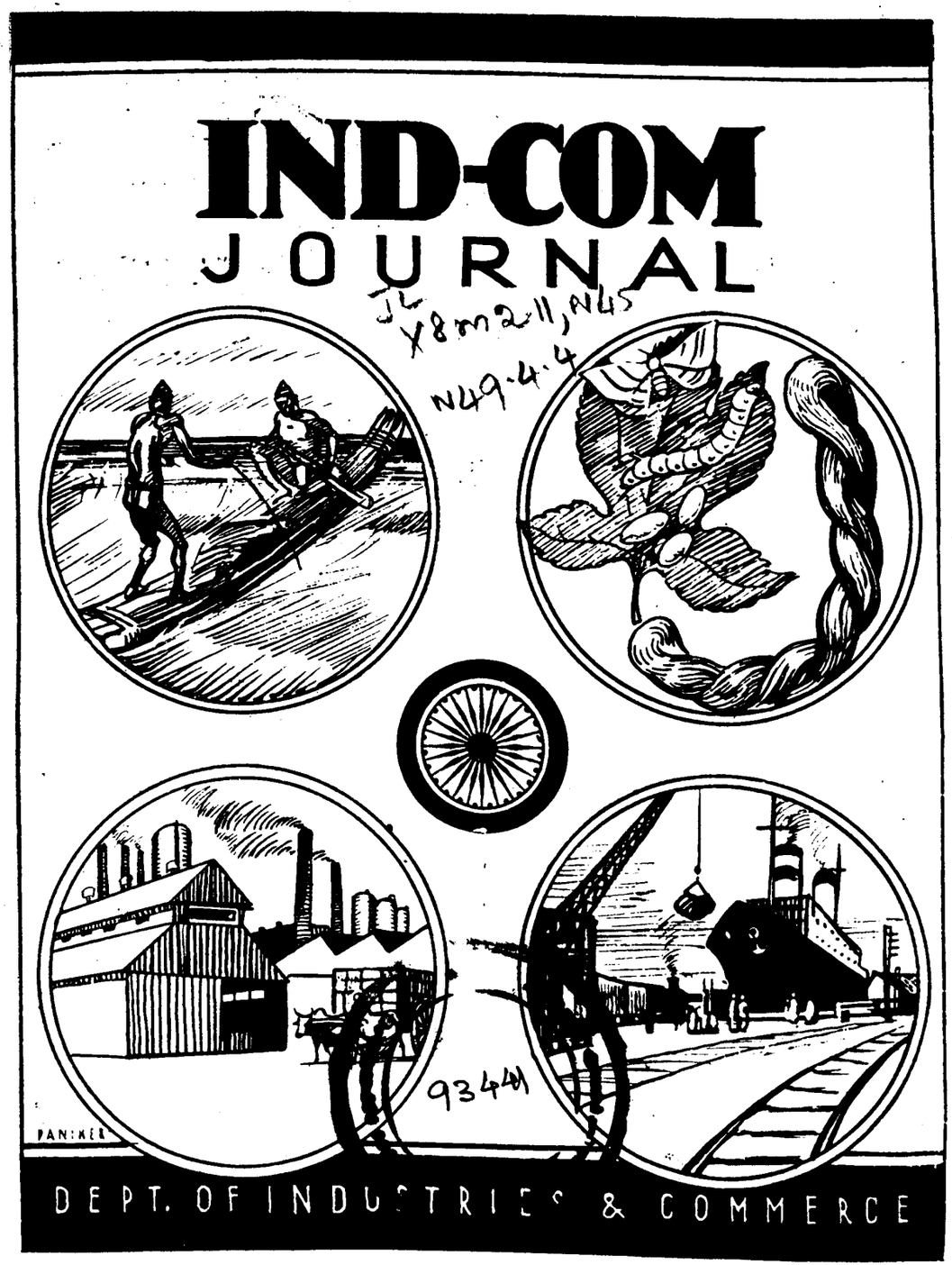

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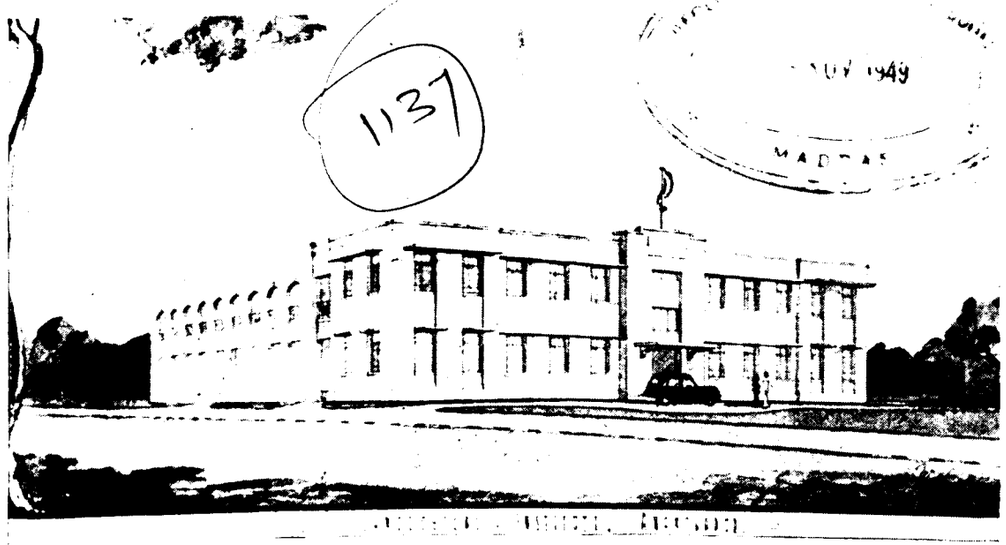

The Hon'ble H. Sitarama Reddy,
Minister for Revenue and
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Minister for Industries,
Government of Madras.

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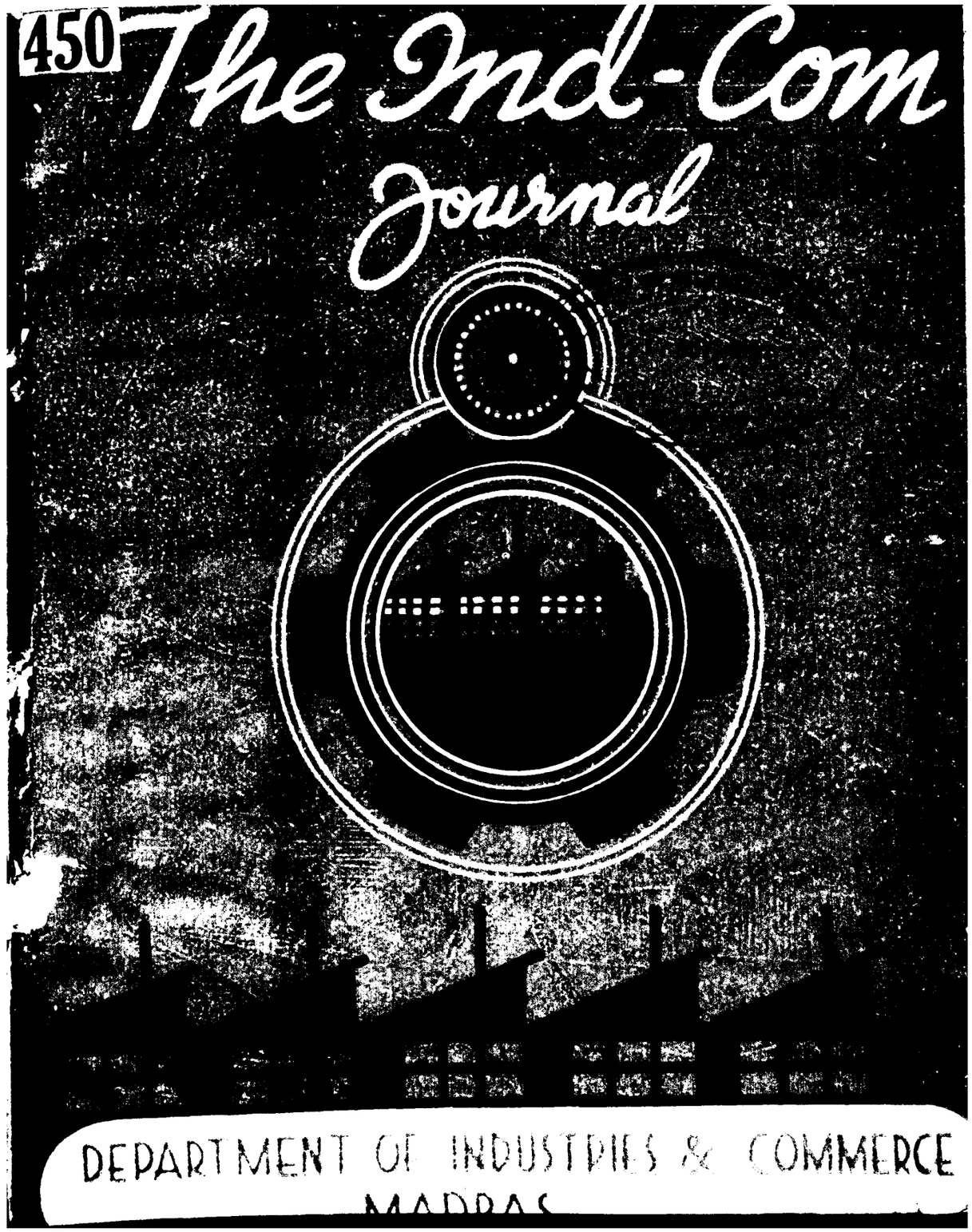
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The Ind-Com
Journal
DEPARTMENT OF INDUSTRIES & COMMERCE
MADRAS

INDUSTRIAL DEVELOPMENT IN MADRAS—PROGRESS DURING 1948—49

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Introduction

The Province of Madras, in common with other provinces of this country has benefited from the conditions which favoured the development of industries during the wartime and the post-war period. During the war the difficulties in securing manufactured goods from foreign countries, to meet the increased demands of the military forces stationed in this country and operating in the neighbouring theatres of war in the mid-eastern and far-eastern countries, constituted the main incentive for the development of industries based on the raw material supplies available in this country. During the post-war period, the war-wrecked industries of the European countries were, and still are, no longer in a position to meet the needs of our country and her neighbours. The emergence of a national government in our country also served as a further impetus to the development of industries for utilising the raw materials available here, which were being exported in pre-war times for the benefit of the industrially more advanced countries of the West. To understand the main trends of industrial development in this province, therefore, it is necessary to review the raw material resources of the province and their development during the past decade.

1. The main raw materials available in this province for exploitation by industries are:

(i) Agricultural Oil seeds, such as groundnuts, gingelly and castor seeds, copra and linseed, fibres, such as cotton, jute, hemp, coir and palmyrah fibre; tobacco; sugarcane, and plantation products such as coffee, tea and rubber.

(ii) Forest produce, such as, timber used for construction; softwood used by the Match and Plywood industries; firewood; sandalwood used for the extraction of sandalwood oil; lac used for the manufacture of varnishes; pyrethrum flowers for the manufacture of insecticides; and tanning materials, such as myrobalans, avaram bark, wattle bark, etc.

(iii) Animal products, such as, hides and skins, bones, hide cuttings and fleshings, wool and hair, silk, etc.

(iv) Marine products, such as, salt, sea-weed, fish, etc.

(v) Minerals, such as, asbestos, barytes, bauxite, china clay, chromite, feldspar, gypsum, magnesite, mica, limestone, Phosphatic nodules, quartz and glass sands, red oxide of iron and ochres, slate stone, graphite, iron ore, coal etc.

The mining of gypsum and limestone have developed considerably but this has been mainly to meet the requirements of the cement industry. With the further expansion of this industry and with the establishment of industries for the manufacture of sulphuric acid and soda ash, more intensive exploitation of these two minerals will be possible.

Magnesite mining has increased two and half times in the decade 1937-47. This has however been mainly for the benefit of the export market. The establishment of metallurgical industries in this province is necessary to enable the magnesite to be utilised locally for the manufacture of refractories and for production of metallic magnesium.

Mica mining is also serving the interests of foreign markets at present and has been feeling all the effects of an unsteady market. The establishment of Industries for the manufacture of electrical machinery and equipment in this country will serve to stabilise this industry by providing a a local market.

The mining of slate stone has received considerable fillip during recent years as a result of the rapid development of the school - slate industry during wartime.

2. Progress in the Establishment of Industries

(*a*) The number of Joint - stock companies in this province registered under the Indian Companies Act increased from 1488 to 3195 during the period 1937-38 to 1947-48. The Authorised and paid-up capital of all the companies have increased during the same period from about Rs. 60 crores to Rs. 180 crores and from about Rs. 19 crores to Rs. 46 crores respectively.

(*b*) The total number of factories in the province registered under the Indian Factories Act has increased from 1879 in the year 1938 to 4167 in the year 1949 and the average number of workers employed daily in the above factories has increased during the same period from 1·94 lakhs to about 2 lakhs.

(*c*) The development of the mor important groups of industries during th period under consideration has been s follows:—

(*i*) *Textile Industry*:—The number of cotton textile mills in the province has increased from 55 in 1938 - 39 to 77 in 1949. The number of spindles and looms in the above mills have increased from 13,19,254 and 6,322 in 1938-39 to 17,86,916 and 8,360 respectively during the same period.

(*ii*) *Sugar Mills*:—The number of sugar mills working in 1938 - 39 was only 7 and the sugar production was 23,000 tons. The number of mills working at present in the province is 10 and the production of sugar is about 50,000 tons per annum. Nine additional sugar factories have been planned to be established in this province and when they commence production the total sugar production in the province is expected to reach 1,20,000 tons per annum.

(*iii*) *Oil Milling Industry*:—The number of oil expellers installed in this province is estimated to be about 1,200 at present as against 700 - 800 before the war. The oil crushing capacity of the expellers, rotaries and country chekkus installed in this province is more than sufficient to deal with the entire oil seed production of the province. The growth of this industry recently has been phenomenal and efforts to keep development in check are indicated as necessary to avoid uneconomic competition.

(*iv*) *Vanaspati Industry*:—There are only two vanaspati factories in the province at present. Ten new factories with the total daily production capacity of 175 tons of vanaspati have been planned and are rapidly nearing completion.

(*v*) *Cement*:—There are four existing cement factories out of which two have been established since 1939. The existing production capacity is 3,65,000 tons per annum. All the factories are to be expanded and three new units have been programmed to be established. The total productive capacity when all the new units commence working and when the existing units expand as programmed will be 10,05,000 tons per annum nearly three times the existing capacity.

(*vi*) The following is a list of some of the important new industries which have been established during the period under review.

1.	M/S. Ajax Products Ltd., Tiruvottiyur.	Abrasives.
2.	,, Link Industries Ltd., Chingleput.	Gip fasteners.
3.	,, Ramaraju Surgical Cotton Mills Ltd., Rajapalayam.	Surgical cotton and dressings.
4.	,, Hebbar Brothers Ltd., Palghat.	Surgical Instruments & Cutlery.
5.	,, Premier Industries, Annarpura, Trichy.	Agricultural implements, estate tools & Nails.
6.	,, Kumar Industries, Edathera.	Agricultural implements.
7.	,, New Era Manufacturing Co., Ltd , Palghat.	Brushes.
8.	,, Textools Ltd., Ganapati, Coimbatore.	Textile Machinery.
9.	,, Kasture Engineers Ltd., Coimbatore.	Textile accessories.
10.	Eastern Electrical Works Ltd., Singanallur.	Electric Motors.
11.	Argus Engineering Co, Ltd., Coimbatore.	Do.
12.	M/S. Titan Paints and Varnishes Ltd., Podanur.	Paints and Varnishes.
13.	M/S. Nanco Rubber Works Ltd., Coimbatore.	Rubber goods.
14.	Madras Enamel Works Ltd., Madras	Enamelled holloware.
15.	Nirmal Glass Works Ltd., Olavakkode.	Glass Ware.
16.	Praga Button Works Ltd., Coimbatore.	Buttons.
17.	Indian Metals and Metallurgical Corporation, Mettur Dam.	Non-ferrous sheets
18.	Tuticorin Salt Refineries, Ltd.; Tuticorin.	Refined Salt.
19	Metal Box Co. of India Ltd., Tondiarpet.	Tin cans.
20.	The India Fruits Ltd, Kadiam.	Fruit canning.
21.	Western India Plywood Co., Ltd., Baliapatam.	Plywood.
22.	The Andhra Pharmaceutical Ltd., Vijayawada.	Pharmaceuticals.
23.	The East India Industries Ltd., Madras.	Waterproof cloth
24.	Cellulose Products Co., Aminjikarai.	Capsules.
25.	Jyothi Paint and Varnish Industries Ltd., Aminjikarai	Paints and Varnishes.

The following are a few important new industries which are being established in the province at present besides the textile, cement, sugar and vanaspati factories mentioned earlier.

1. Ashok Motors Ltd, Madras—Motor cars (assembly and manufacture).
2. Madras Rubber Factory—Rubber goods.
3. Purnima Paper and Strawboard Mills Ltd. Moodbidri—
4. Venkateshwara Paper and Straw Board Mills Ltd.
5. Micanite and Mica Products Ltd, Gudur—Micanite, etc.
6. Southern Metals and Alloys Ltd, Salem—Nonferrous metal sheets.
7. Amer—Hind Ltd, Podanur—Typewriter Ribbon and Carbon paper.
8. Hollow—Block Co Podanur-Hollow cement building blocks.

Besides the above a number of new units are under contemplation for the manufacture of the following goods.

1. Fused phosphatic fertilisers.
2. Caustic Soda and Soda Ash.
3. Iron and Steel.
4. Radios and electrical goods.
5. Paper
6. Power Alcohol
7. Tewn gas.
8. Sulphuric Acid.

(*a*) ***Raw Materials of Agricultural Origin:***—The Statements A and B appended hereto indicate how the production of raw materials of agricultural origin has progressed from 1936 to 1948. It will be seen that the production of groundnut has varied but little during the above period except in one year — 1937-1938—when there was a phenomenal increase by about 25% over the average annual production of 1,600,000 tons. The production of copra has also been fairly steady, the actual quantity produced averaging 75,000 tons per annum. The production of gingelly and castor seeds both show a decline by about 25% and 20% respectively. The production of linseed on the other hand has steadily increased, the area taken up for the crop at present being nearly four times what it was in pre-war days.

The production of Cotton, the Chief among the fibres cultivated in this province, has received a sharp set-back by as much as 50% from the pre-war value. The main reason for this decline appears to be the gradual elimination of short staple varieties which formed the bulk of the cotton produced in this province and which depended for their market on foreign countries such as Japan and China. Jute cultivation in this province reached a peak during 1939-40 and subsequently declined to about 65% of the peak-value. Considering the importance of this raw material and the necessity for developing an independent source of supply after the separation of East Bengal from this country, the possibilities of expanding cultivation of jute in this province require to be fully exploited. The cultivation of hemp has also declined by about 60% from the peak-value which was attained during 1937-38, the reason for this being probably a decrease in the demand from the export market on which this commodity largely depended. Statistics of coir and palmyrah fibre production are not available, but the exports of these fibres show a decline, which may be due to increased consumption internally by industries which have developed in this province, during recent years.

The cultivation of tobacco has been fairly steady, although there appears to be a decline in the yield per acre during recent years. Sugarcane cultivation and production, on the other hand, have recorded a steady increase, the present production being about 2½ times the pre-war value. This is in keeping with the plans for expansion of the sugar industry in this province.

Cultivation of citrus fruits has nearly doubled during the period under review, indicating that the syrup and fruit canning industries, established in this province in recent years, are progressing satisfactorily.

Statistics of cultivation and production of tapioca are not available for more than three years. It has however been established that tapioca forms a good substitute for maize in the manufacture of starch and several industrial units have been established recently in the districts of Salem and Coimbatore for the manufacture of starch from tapioca.

Rubber production in this province and in the neighbouring states has also registered increases; statistics of the pruduction of raw rubber are however not available.

(*b*) ***Forest Produce***:—The statement C appended hereto shows how the production of the raw materials of forest origin has varied from year to year during the period under consideration. The extraction of timber has been fairly steady. The extraction of softwood which appears to have commenced in 1938 - 39 has increased by leaps and bounds until it is about 10 to 20 times the pre-war figures. This appears to be mainly due to the phenomenal development of the match and plywood industries in this province during the war time. The extraction of firewood for use as fuel has also doubled since the prewar period. The extraction of bomboos does not appear to have made much appreciable progress, the difference in the values given in the statement being

mainly due to increase in the price of bomboos. The extraction of sandalwood has been fairly steady, except for recent years when there has been a fall by about 15 to 20%. The collection of lac, which had been undertaken by the Forest Department as an experimental measure, does not show steady results. The collection of pyrethrum flowers on the other hand appears to have been attended with considerable measure of success, about 92,500 lbs being collected on the average per year during the two years for which figures are recorded.

(*c*) ***Raw Materials of Animal origin*** :—The statistics of population of cattle, sheep and goats of this province show that there has been a fall in the population due to excessive slaughter during the war period. This coupled with the separation of Pakistan has affected the supply of raw hides and skins to this province considerably. Although accurate statistics are not available, the above applies equally to the supply of other raw materials of animal origin such as wool, wide fleshings, bones etc.

The statement F appended shows how the cultivation of mulberry in this province has progressed during the years 1939 - 48. During this period, the area under mulberry cultivation has increased four-fold, due mainly to the efforts of the Industries Department on the one hand and to the fillip given to the silk industry due to war-time conditions. Imports of silk from foreign countries have been curtailed and it is to be hoped that this will result in an impetus to the industry to improve methods of cultivation of mulberry, silk worm rearing and silk reeling and enable the indigenous industry to effect economies in the cost of production.

(*d*) ***Marine Raw Materials***:—Under this head may be mentioned salt and fish. There is no dearth of the raw materials and advantage has to be taken of the extensive coast line of this province to develop the salt and fish industries.

(*e*) ***Mineral Raw Materials.***

(*i*) *Survey*:—Prior to 1939, no surveys worth the name had been conducted to locate the deposits of valuable minerals in this province and ascertain the extent of these deposits. During the period under review, however, a separate party of the Geological Survey Department of the Government of India has been formed for conducting the intensive survey of the mineral deposits of this province. As a result of the surveys organised and conducted by the party, valuable information has been gathered together regarding the location and extent of deposits of several minerals valuable to industry, several mineral deposits which are known to occur have not been quantitatively surveyed yet. In spite of this, the statement does give an indication of the exploitation for the development of industry.

(*ii*) *Mineral Production* :—The statement H appended hereto shows how the extraction of minerals has progressed in this province from 1934 - 1947. The extraction of barytes which reached a peak value of nearly 16,000 tons in the year 1939 has recently dropped to a little over 5,000 tons. The reason for this appears to be the non-existence of any industries worth the name in this country for the utilisation of the mineral, with the result that mining has been dependent on the export market and has flourished or dwindled according to the condition of this market. The establishment in this province of industries utilising the mineral, such as, litho-phone manufacture, therefore, deserves attention.

The mining of Bauxite has been mainly carried on for the production of artificial emery on a very small scale and this is the reason for the small progress attained in its extraction. The establishment of an industry for the manufacture of aluminium near the deposits is indicated as an important step towards the exploitation of this valuable mineral.

D. Population statistics of Cattle, Buffaloes, Sheep and Goats for Madras Presidency

		1934-35	1939-40	1944-45
1. Cattle (a) Over 3 years	...	12,985,760	12,190,893	12,749,628
(b) Under 3 years	...	4,803,971	3,806,202	3,605,286
Total cattle	...	17,789,731	15,997,095	16,354,914
2. Buffaloes (a) Over 3 years	...	4,280,257	4,089,843	4,222,202
(b) Under 3 years	...	2,536,867	2,032,464	2,067,123
Total Buffaloes	...	6,817,124	6,122,307	6,289,325
3. Sheep (a) Over 1 year	...	...	11,312,870	8,351,827
(b) Under 1 year	...	...	3,094,401	2,217,362
Total sheep	...	11,938,724	14,407,271	10,569,189
4. Goats (a) Over 1 year	...	...	5,994,435	4,565,656
(b) Under 1 year	...	...	1,973,459	1,521,994
Total goats	...	6,761,921	7,967,894	6,087,650

E. Estimate of production of hides in Madras by G.O.I. (1948)

	Total population.	% of fallen hides to population.	% slaughtered hides to population.	Number of hides.		
				fallen	slaughtered.	Total.
Kips ...	16,564	16.9	4.1	2,799	679	3,478
Buffs ...	6,300	21.7	5.3	1,374	329	1,703

F. Area under mulberry cultivation

Year.	Acreage under mulberry.
1939-40	5,720
1940-41	5,879
1941-42	8,479
1942-43	12,000
1943-44	15,500
1944-45	16,214
1945-46	18,630
1946-47	19,684
1947-48	21,633

G. Mineral Deposits Located and Estimated by the Geological Survey of India

Name of Mineral	Location of deposit.	Estimate of extent of deposits.
1. Apatite ...	Sitaramapuram, Vizag. Dist.	5,000 tons within a depth of 30 feet.
2. Asbestos ...	Brahmanapalle, Lingala area Cuddapah Dist.	2,56,000 tons.
3. Bauxite ...	Shevaroy Hills, Salem Dist.	65,00,000 tons.
4. Chromite ...	Sittampundi, Salem Dist.	1,00,000 tons within a depth of 10 feet.
5. Coal-Lignite ...	Neyveli, S. Arcot Dist.	Present estimate 49,80,00,000 tons but fresh seams discovered recently indicate that the deposits are far more extensive then the above estimate reveals.
6. Garnet ...	Coastal Sands of Tinnevelly Dist.	50,000 tons.
7. Graphite ...	Tinnevelly Dist.	650 tons within 25 io 30 feet depth.
8. Gypsum ...	Trichinopoly Dist.	1,50,00,000 tons within 60 feet depth.
9. Iron Ore ...	(i) Salem—Trichinopoly area :	30,46,00,000 tons.
	(ii) Kurnool	37,00,000 tons.
	(iii) Sandur	13,00,00,000 tons.
10. Lime Stone ...	Tinnevelly Dist.	20,00,000 tons.
	Mathurai ,,	15,00,000 tons.
	Trichy ,,	50,00,000 tons.
	Salem ,,	7,40,000 tons.
11. Phosphatic Nodules.	Trichy Dist.	20,00,000 tons within 50 ft. depth.
12. Magnesite ...	Salem Dist.	8,30,000,000 tons.
13. Strontum Ore ...	Trichy Dist.	50,090 to 1,00,000 tons within a depth of 10 feet.

H. Production of Minerals in Madras—Tons

	1934	1935	1936	1937	1938	1939
1. Chromite ...	...	...	...	...	...	...
2. Asbestos ...	58·2	7·69	...	...	24	38
3. Barytess ...	2,899	3,347	2,375	9,056	9,516·5	15,868·25
4. Bauxite ...	...	...	...	...	...	...
5. Calcite. ...	...	...	...	...	...	...
6. China clay ...	...	...	...	...	...	...
7. Felsper ...	...	...	...	...	...	...
8. Gypsum ...	55	527·75	1,505·81	1,597	9,381	9,812
9. Magnisite ...	11,859·5	12,840	12,966	23,782	23,052	29,903
10. Manganese ...	20,145	16,135	13,903	21,159	31,813	34,640
11. Mica ...	385·99	438 31	1,377·98(a)	2,667·64(a)	3,721·73	2,587·76
12. Phosphatic Nodules.	...	...	...	...	...	...
13. Quartz ...	...	...	...	...	...	...
14. Red oxide of Iron ...	...	...	...	...	...	...
15. Stealite ...	40	246	74	150	25	84
16. Lime Stone ...	79,566	72,039	82,403	1,49,959	1,75,500	1,58,921
17. Lime Shell ...	...	...	...	...	...	...
18. Slate Stone ...	...	...	...	...	...	...
19. Yellow Ochre ...	...	...	...	...	...	...
20. Graphite ...	...	...	...	...	...	...

3. Government Industrial Units Operation

The Industrial Department runs a few industrial concerns on a commercial basis, viz. Kerala Soap Institute, Calicut, Government Oil Factory, Calicut, Government Silk Filatures, Kollegal, the Coir Factory, Beypore, the Andhra Paper Mills, Rajahmundry, and Government Ceramic Factory, Gudur, as model units and at the same time to serve national needs. The Kerala Soap Institute is the oldest of the lot, having completed 32 years. It serves as a training institute for soap makers. The average production now is about 700 tons per annum and proposals are on hand for increasing the production to 900 tons per annum. The Government Oil Factory, which was established during war time, is making steady progress. Madras Government brand Shark Liver oil, which is considered to be cheaper and more nutritious than imported cod liver oil, and "Adamin", which is a high potency oil, are getting popular, in the market. The Government Silk Filatures, Kollegal, which was also established during wartime, produces raw silk and proposals are on hand to install a twisting plant capable of producing twisted silk for ready use by Weavers, and also a weaving factory to produce high grade silk fabrics. The Kollegal Silk Filatures Ltd., which is a private concern, was taken over by Government in 1942, as it was not functioning satisfactorily and later on amalgamated with the Government Silk Filatures.

2. The Department has recently established a factory at Gudur for the manufacture of Ceramic ware and porcelain insulators. It has also established several service centres for the province for supply of body and glaze for cottage manufacturers of porcelain ware, Rocking hamware and stone ware and has proposals for supply of block-glass to bangle makers.

The Andhra Paper Mills, which went into liquidation, was purchased by Government at a cost of 25 lakhs of rupees. Government took over the concern actually in April '48, and after carrying out certain items of urgent repairs in plant and machinery, commenced partial production of paper in August last. The mill is now producing about 3 tons of paper per day of different varieties. Certain major items of repair are now on hand, after which full production of about 10 tons of paper per day will be started.

The Department is constructing at Calicut, a factory for the manufacture of Vanaspathi, and at the same time, to train up personnel required for several private factories which are being established in the Province.

4. State Aid To Industries

The number of applications from Industrial units for State Aid and the amount of aid sanctioned and the number of industries aided have increased phenomenally after the establishment of a national government as will be seen from the statement M appended hereto. Of the 43 Industrial units aided under the Act and mentioned in the statement, 10 received aid prior to 1946, 5 during the period 1946-47 and 28 in 1948-49.

A. Area shown to crops

	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43 & 1943-44	1944-45	1945-46	1946-47	1947-48
Oilseeds.											
Groundnut	3,495,023	4,657,596	2,771,588	3,617,600	...	...	3,742,840	4,299,592	4,165,385	4,121,394	4,066,830
Gingelly	802,143	794,875	876,397	734,496	...	...	718,020	599,056	599,056	672,870	638,367
Castor	263,870	246,718	270,278	266,051	...	...	280,360	284,759	235,263	229,243	240,823
Cocoanuts	606,290	586,130	585,424	608,607	...	...	606,290	615,518	613,997	618,813	815,983
Linseed	...	1,576	2,159	2,416	...	...	...	2,689	3,450	4,707	6,649
Rape & mustard	...	2,424	1,760	1,746	...	...	...	2,161	1,558	1,791	3,098
Others	71,960	71,271	64,428	56,610	...	...	71,960	102,671	72,312	53,604	...
Total Oil Seeds	5,221,883	6,353,383	5,568,149	5,287,526	...	...	5,419,470	5,906,446	5,690,021	5,702,422	5,771,750
Fibres.											
Cotton	2,487,052	2,543,306	1,928,718	2,106,284	...	...	2,022,940	1,670,141	1,611,838	1,566,630	1,297,647
Jute	17,734	21,936	17,650	41,183	...	...	...	18,570	33,779	33,301	27,503
Bombay Hemp	26,837	40,893	59,534	33,896	...	...	...	25,885	19,910	7,104	12,186
Sunhemp	107,726	169,530	141,165	134,430	...	...	229,240	141,582	157,910	110,922	69,384
Others	...	5,102	11,275	14,224	...	...	...	22,812	8,191	4,761	16,583
Total fibres	2,639,349	2,780,767	2,158,342	2,420,017	...	...	2,252,180	1,878,990	1,831,628	1,722,618	1,423,283
Dyes.											
Indigo	30,093	23,167	28,576	30,386	...	...	42,500	47,845	42,373	26,940	22,867
Other dyes	902	1,305	1,658	1,681	...	...	2,050	4,414	2,581	3,331	3,172
Total dyes	31,000	24,472	30,234	32,067	...	...	44,550	52,259	44,954	30,271	26,039
Tobacco	253,160	294,432	320,134	307,172	...	...	283,920	328,185	363,036	303,997	293,759
Sugarcane	119,650	97,965	98,262	137,633	...	...	145,900	155,596	161,700	202,828	272,680
Myrta	75,423	76,724	79,320	75,752	...	...	...	69,694	79,327	78,535	73,587	
Cacao	...	...	...	...	...	...	...	...	25,745	24,956	32,954
Oranges	...	240,652	249,579	250,938	...	...	249,090	244,709	247,310	243,409	231,000
Plantains	...	138,480	138,117	138,117	...	...	134,960	141,172	157,184	162,781	68,654
Others	...	24,379	22,320	26,789	...	...	...	43,574	50,107	46,437	45,050

H. Production of Minerals in Madras—Tons—*cont.*

		1940	1941	1942	1943	1944	1945	1946	1947
1.	Chromite ...	...	...	...	...	500	...	274	...
2.	Asbestos ...	35	29	60	...	...	...	18	...
3.	Barytess ...	13,415	16,496	7,089 25	...	...	...	11,603	5,136½
4.	Bauxite ...	...	...	1,122	...	...	...	1,662	1,368
5.	Calcite ...	...	...	86	...	...	...	495	...
6.	China clay ...	...	...	569	...	...	...	30	4,424
7.	Felsper ...	...	...	22	...	...	...	82	228
8.	Gypsum ...	18,753·83	17,138	22,404	12,736	16,880	27,811	15,301	23,250
9.	Magnisite ...	37,304·75	36,527	41,639	42,734	38,025	28,047	43,628	51,672½
10.	Manganese ...	29,536	14,565	3.065	...	...	...	...	...
11.	Mica ...	2,061·15	1,765·35	1,892·9	2,160	1,420	1,144	1,693	...
12.	Phosphatic Nodules	117	51	120	462	311	524	243	853
13.	Quartz ...	...	...	189	...	...	...	...	...
14.	Red Oxide of Iron.	...	...	205·75	253	1,042	1,452	1,764	836½
15.	Stealite ...	5·7	36·36	...	535	...	...	...	...
16.	Lime Stone ...	1,63,290	1,52,986	2,32,599	1,89,456	1,97,116	2,07,042	1,74,390	1,59,217
17.	Lime Shell ...	...	...	...	...	3,408	...	850	700
18.	Slate Stone ...	...	...	...	...	727½	949	745	...
19.	Yellow Ochre ...	...	...	...	...	864	1,122	61	½
20.	Graphite ...	...	...	...	...	...	91	95	25

J. Abstract Statement of Industrial Establishments in Madras Registered under the Indian Factories Act

Year.	No. of factories on Register.	No. of Factories in Commission. Seasonal.	Non-Seasonal	Total.	Average No. of Workers daily.
1938	1876	528	1290	1818	1,94,335
1939	1900	519	1292	1811	1,27,266
1940	1916	528	1363	1891	2,11,194
1941	1978	518	1437	1955	2,34,072
1942	...	...	...	...	...
1943	...	...	...	...	...
1944	...	...	...	...	...
1945	2889	450	2583	3033	2,79,176
1946	3217	377	3072	3449	2,62,292
1947	3554	343	3418	3761	2,76,586
1948	3928	308	3652	3960	2,88,722
1949	4167	...	...	...	...

K. Detailed Statement of Industrial Establishments in Madras, registered under the Indian Factories Act.

Government & Local Fund Factories

A. Perennial	1939	1948
Clothing	...	...
Breweries and Distilleries	...	...
Carpentry	...	...
Cotton Mills	...	1
Dockyards	1	1
Electrical Engg.	3	5
El. Generation & Transmission	2	8
Engineering (General)	1	2
Forage Presses	9	23
Quinine	1	...
Medical Stores	1	...
Mints	1	...
Soap Making & Oil Refining	1	...
Ordinance Factories	1	1
Industrial Institution	...	5
Printing Presses	3	6
Railway Workshops	...	23
Saw Mills	...	...
Stone Dressing	...	...
Tanneries	...	...
Telegraphs	...	...
Water Pumping Stations	3	6
Drainage Works	1	1
Wooden Mills	1	...
Chemicals and Dyes	1	19
Stationery Stores	...	...
Miscellaneous	...	...

B. Seasonal	1939	1948
Forage Presses	...	1
Miscellaneous	...	1

All other Factories

A. Perennial (Textiles)	1938	1948
Cotton (Spinning, Weaving and other Factories)	53	82
Hosiery	10	15
Jute Mills	2	4
Silk Mills	7	13
Woollen Mills	...	5
Miscellaneous	3	10
Total		129

Engineering

	1938	1948
Coach Building and Motor Repairing	15	245
Electric Engineering	2	10
Ele. Generating & Transforming Stations	4	3
General Engineering	8	160
Kerosine Tanning and Packing	...	2
Metal Stamping	...	...
Railway Workshops	22	1
Ship Building & Engg.	...	2
Steel Trunk, Lock & Battery	...	6
Tramway Works	...	1
Miscellaneous	...	24
Total		454

Minerals & Metals

	1938	1948
Foundries	11	44
Iron and Steel Melting and Rolling Mills	2	3
Head Melting and lead rolling Mills	...	...
Petroleum Refineries	...	16
Metal Works	...	12
Miscellaneous	...	26
Total		92

Food Drink & Tobacco		
Bakeries, Biscuits and Confectionery	...	17
Breweries & Distilleries	7	3
Coffee	...	6
Tea	...	81
Dairy Produce	...	1
Flour Mills	...	2
Fruit Canning & Bottling	...	1
Ice and Aerated Waters	...	1
Rice Mills	496	908
Sugar	4	3
Tobacco	11	16
Water Pumping Stations	...	...
Miscellaneous	...	327
Total		1,366
Chemicals Dyes etc.		
Bones and Measures	11	17
Chemicals	...	9
Dyeing and Bleaching	...	1
Gas Works	...	...
Lac	...	...
Matches	...	122
Oil Mills	10	282
Paints	...	2
Soaps	...	6
Turpentine and Rosin	...	...
Miscellaneous	...	31
Total		470
Paper & Printing		
Paper Mills	...	2
Paper Pulp	...	...
Printing & Book-Binding etc.	...	390
Miscellaneous	...	15
Total		407
Wood, Stone & Glass		
Bricks and Tiles	62	82
Carpentry and Cabinet making	...	12
Cement, Lime and Potteries	...	7
Glass	...	7
Saw Mills	10	36
Stone Dressing	...	18
Miscellaneous	...	62
Total		224

Gins and Presses		
Wood Baling Presses	...	...
Miscellaneous	...	150
Total		150
Skins and Hides		
Leather and Shoes	4	3
Tanneries	6	207
Miscellaneous	...	2
Total		212
Miscellaneous		
Rope Works	6	7
Jewellery Works	...	8
Miscellaneous	...	24
Total		39

Seasonal

Food Drink and Tobacco		
Coffee	19	12
Ice and Aerated waters	...	...
Rice Mills	...	...
Sugar	9	8
Tea	75	...
Tobacco	...	...
Miscellaneous	...	20
Total		40
Chemicals, Dyes, etc.		
Wood, Stone & Glass		
Gins and Presses		
Cotton Ginning	...	35
Cotton Ginning & Baling	349	80
Ginning and Pressing	...	36
Miscellaneous	...	111
Total		262

L. Production of Industrial Establishments Worked by the Industries Department

Year.	K. S. I.		G. O. F.		G. S. F.
	Soap.	Pyretbrum.		Silk.	
1937-38	—	—	—	—	—
1938-39	213	...	...	...	...
1939-40	215	...	...	...	...
1940-41	208	...	...	...	...
1941-42	203	...	...	...	...
1942-43	350	30	...	...	...
1943-44	425	850	14,000	...	...
1944-45	710	715 gallons	2[illegible],049	61,959 lbs.	...
1945-46	676	...	16,000 gallons	47,519 lbs.	3,484 lbs.
1946-47	648 tons.	...	1,05,050 lbs.	83,528 lbs.	...
1947-48	660 tons.	1,500 gallons	1,19,567 lbs.	43,340 lbs.	...

M.—List of Industries aided by the Government of Madras under the Madras State Aid to Industries Act.

	Loan.	*Subsidy.*	*Overdraft.*
	Rs.		
1. Boddu Paidanna & Sons, Vijayanagaram—Oil Mills ...	40,000	...	...
2. Damodar Envelope Factory, Madras—Manufacture of envelopes ...	6,500	...	...
3. Ratnam Industrial Works, Vepery, Madras ...	1,000	...	...
4. M. Doraikannu Pillai, Salem—Button Manufacture ...	300	...	...
5. T. G. Natesam Pillai, Salem—Button Manufacture ...	200	...	...
6. M. Arunachalam Pillai, Salem—Button Manufacture ...	200	...	...
7. Ramaswami Chettiar, Salem—Button Manufacture ...	200	...	...

FOREST AND INDUSTRY

By RAO SAHIB S. RENGASWAMY IYENGAR

It is not widely recognised that the forest is a store-house for industry and that her wealth is immense consisting chiefly of (1) vegetable wealth, (2) material wealth and (3) animal wealth. Before considering the industrial benefits that forests confer upon man, it is essential that we should realise the non-industrial benefits derived from forests. In the first place, forests exercise a wholesome influence upon the temperature of a place. The effect of forests during the growing season is to lower the temperature of the air in and above them and to lower the soil temperature and correspondingly reduce evaporation, by reducing the absorption of heat by the earth's surface. Forests moderate the heat in summer and modify the extremes of cold in winter. Secondly, they exercise a beneficial effect by decreasing evaporation and wind erosion, by diminishing the velocity of wind. They have also an influence on the local distribution of rainfall by lowering the temperature of moisture-laden winds. They hold up and regulate the flow-off of the rain that does fall. Thus forests by their effect upon climate, wind, and rainfall exercise a beneficial influence upon man and beast.

The importance of forests both from the national and economic aspects has been realised by most of the countries which have maintained a large percentage of the land area under forests. In Finland a very small country, 73·5% of the land is kept covered by forests. In Belgium where the population is over 655 per Sq. mile, 18·2% of the land area is forest. In Germany where the population is 300 per Sq.mile, the forest is 23·8%. In France the population is 650 per Sq.mile and forest is 18·4%. In India, which is yet to be industrialised and which has a population of only 200 per Sq. mile, the forest is only 15% and in South India, it is only 11·4%. Thus, as in matters of health, income and education, even in the matter of forests, we occupy the lowest position amongst the nations of the world. In Japan, with 358 persons per Sq. mile, where the fullest and most efficient use of the land for food production is essential and where everywhere one finds most intensive cultivation, 55·7% of the total land area is kept under forests to supply timber, pulp wood, fuel in the form of charcoal etc. A considerable area of the forest is also reserved mainly to ensure regularity of stream flow and prevent soil erosion and landslides.

Wood is more generally used by the Japanese than by other people of the world. Their temples are made of polished wood. Several of these wooden temples are over 5 centuries old. The Japanese have an innate reverence and love for trees and they look upon grooves of trees as temples of nature. Every temple has got a garden round it. Leading to the celebrated Nikka Shrine there is an avenue of giant cryptomerias trees which is over 30 miles long, planted 300 years ago. A poor Japanese thinks nothing of walking a hundred miles or more to see some famous forest or garden in its full flowering splendour. This love of natural beauty is given to the Japanese as part of his education. Our national Government should attempt to infuse this innate love of tree growth, into our people by employing real foresters or horticulturists in the forest department.

The industries that now exist on a miniature scale and can be organised and developed in suitable localities can be grouped under 2 classes, namely (1) wood and wood manufactures and (2) Industries that can be developed by using minor forest products.

Wood and Wood Manufactures

Timber is the basis for 6 main fields of commercial exploitations.

(i) as a structural material in almost every field of engineering application.

(ii) as a paper making and textile medium.

(iii) as a valuable medium for heating and lighting.

(iv) as a cheap, efficient and universal source of power for stationary as well as moving engines.

(v) as a basic material for food and fodder.

(vi) as a new material for important chemical by-products.

Several cottage industries such as making of dolls, toys, brushes, buttons, combs, penholders pencil slots, slate frames, match splits and boxes, toothpicks, tool handles, walking sticks, small wooden containers, charcoal briquetting etc, can be started.

In America and elsewhere there is a fuller utilisation by involing the aid of the latest discoveries of science. Saw-dust is converted into "Sacchu'ose" useful for the distiller and agriculturist Wood cellulose is made to yield artificial silk and also a new packing material in the form of wood fibre.

Transparent sheets of cellulose are now being used for making laminated "glass" which is bullet-proof. Chemists hope to get glucose from wood and very soon our breakfast may consist of material got from pieces of wood.

Our import of wood and wooden articles entails an expenditure of several crores of rupees. We import about 8 million packing boxes every year. If the whole quantity is manufactured within the country with the suitable wood available in our forests an enormous capital can be built up apart from providing employment to a large number of people. Detailed information on the various uses of wood will be given in a separate article.

2. Industries that can be Developed by Using Minor Forest Products

(a) (i) *Sandalwood* :—India is practically its home though there is an opinion that it is indigenous to Timur islands. It grows almost anywhere, even at sea level and in regions of heavy rainfall. But its typical home is in the dry forests bordering on Mysore at elevations between 2000 to 3500 feet. It is an obligatory root parasite. The fragrant reddish heartwood yields about 5–7 P.C. of valuable aromatic oil, used in perfumery, medicines, ritualistic ceremonies etc. The usual price is 20 shillings per pound. The wood costs about £60/-per ton. The sandalwood oil of commerce is mainly distilled in Europe, though it is extracted to some extent in Mysore and in Madras Presidency. This should be Indianised.

(ii) *Teakwood oil*:—The other wood that is capable of yielding any oil is teak which gives a tar oil of economic value. This distillation can be arranged at Nilambur the centre of Teak plantations as well as in Wyanad to utilise all the scraps and rejections of teak now going waste in our Presidency. This distillation can be started in all centres of Teak in other Provinces also.

(b) *Grasses* :—These form an important Forest product useful not only for cattle breeding but also for various other industries.

As in the case of grazing the cutting of grass removes a certain amount of manurial matter from the ground and may also deprive young seedlings of shelter; the benefits of removal outweigh its disadvantages in freeing seedlings from suppression and in diminishing the danger from fire. Therefore, it is cut and removed as hay and also for ensilage which is a method of storing green fodder in an air-tight place, under pressure to be used in the stall-feeding of cattle. These operations form very important subsidiary industries for cattle breeding absolutely essential for an agricultural country like India both from the

		Loan.	*Subsidy.*	*Overdraft.*
8.	Ramaraju Surgical Cotton Mills, Rajapalayam, Surgical Cotton, etc. ...	Rs. Shares of value Rs.		7,500
9.	Kollegal Silk Filatures, Kollegal ...	Shares of value Rs.		17,850
10.	Radio and Electricals Ltd. ...	Shares of value Rs.		2,00,000
11.	K. Brahmam & Sons., Bhimavaram, Fountain Pen Manufacture ...	3,000	...	...
12.	K. V. Ratnam Bros., Rajahmundry—Fountain Pen Manufacture ...	...	...	2,000
13.	P. Narayanappa, Hosur—Tile Manufacture ...	5,000	...	...
14.	Industrial and Commercial Syndicate, Madras —Manufacture of Stores ...	85,000	...	...
15.	Mohan Industries Ltd., Tenali—Tile Manufacture ...	1,00,000	...	...
16.	Metal Industries Ltd., Shoranur—Manufacture of Agricultural implements ...	1,00,000	...	...
17.	K. Seshadri, Kuppam—Invention of I.C. Engine.	...	...	1,000
18.	D. Gopalakrishna Naidu, Startyre Works Madras—Tyre Repairs & Manufacture of Rubber toys ...	12,000	...	...
19.	Venkateswara Paper & Board Mills Ltd., Tirupati—Manufacture of Straw Board ...	2,50,000	...	...
20.	Sudarsan Oil Mills Ltd., Katpadi—Manufacture of Vanaspati ...	10,00,000	...	...
21.	Andhra Pharmaceuticals Ltd., Vijayawada—Manufacture of Drugs & Pharmaceuticals ...	...	...	50,000
22.	Solar Industries & Trades Ltd., Erode—Bleaching, Dyeing & Finishing of handloom cloth.	1,50,000	...	...
23.	Radhakrishnan Vegetable Oil Products Ltd., Pamidi—Oil Refinery ...	1,25,000	...	...
24.	The Quilandy Artisan's Co-operative Society, Quilandy—Metal working ...	...	3,000	...
25.	Attili Sattaraju, Krishna Cycle Works, Ambajipatti—Cycle Spares Manufacture ...	5,000	3,000	...
26.	The Vegetols Ltd., Chittoor—Vanaspathi Manufacture ...	5,00,000	...	...
27.	Y. M. Ghouse Mohideen, Roshan Soap Works, Dharmavaram—Soap Manufacture ...	4,000	...	...
28.	Rayalaseam Mills Ltd., Adoni—Cotton Spinning	7,50,000	...	...
29.	Madras Vanaspati Ltd., Villupuram, Vanaspati Manufacture ...	10,00,000	...	...
30.	Ganga Works, Adyar—Soap Manufacture ...	85,000	...	...
31.	K. V. Ratnam Bros., Rajahmundry—Fountain pen Manufacture ...	4,000	...	...

		Loan.	*Subsidy.*	*Overdraft.*
32.	Pakananda Oil Mills, Ltd., Nagari—Oil Milling & Foundry ...	Rs. 40,000	...	...
33.	Metal Industries Ltd., Shoranur—Manufacture of Agricultural Implements ...	75,000	...	...
34.	Purnima Strawboard & Paper Mills Ltd., Moodbidri—Strawboard Manufacture ...	80,000	...	...
35.	Seranad Industrial Corporation, Rasipuram ...	30,000	...	...
36.	Sri Swarna Industrial & Engineering Co., Ltd., Vijayawada—Foundry & Engineering W/S. ...	20,000	...	...
37.	National Manure Works, Udamalpet, Manure Manufacture ...	25,000	...	...
38.	Link Industries Ltd., Chingleput—Manufacture of Zip fasteners ...	2,30,000	...	...
39.	Kanara Ceramics Ltd., Kasaragode, Manufacture of Ceramic Ware ...	60,000	...	...
40.	Sri P. Lakshmanaswami, Kodikonda, Manufacture of Shuttles ...	...	2,000	...
41.	Sri Vijayalakshmi Textiles Ltd., Manufacture, Gudiyatham Silk Weaving ...	24,000	...	...
42.	Sri K. Anantanarayanan, Beacon Chemicals, Madras—Manufacture of Insecticides etc. ...	6,000	2,000	...
43	Kumar Industries, Edathara—Manufacture of Agricultural Implements ...	1,00,000	...	...

EQUITABLE DISTRIBUTION OF WEALTH

A country's economic questions are also, to a large extent, inter-related with its national life. The real wealth of a country is what it produced from year to year. The changing of ownership of money is not wealth, wealth does not mean Silver and Gold, but what is manufactured in the factories and produced from the land. In order to increase the country's wealth, we must augment all-round production in the field and in the factories. For equitable distribution among the people, there must be plenty of wealth.

PANDIT JAWAHARLAL NEHRU

point of view of manure and the manufacture of dairy products. Practically very little work is done by the Forest Department in this direction.

Apart from the fodder value the grasses are used for thatching and fibre for ropes. The well-known "Shahjehanpur matting" is manufactured from '*Saccharum Munja* and *Ischoemum Angustifolium*. The thick stems are used for basket work, large verandah chicks, the ceilings of verandahs and similar purposes. Scented mats usually hung over doors and windows and kept wet to afford coolness in the hot weather are made of *Andropogon Muricatus*. The fibrous stems and leaves of *Typha Elephantina* commonly called the elephant grass are used for ropes, baskets and matting. The method of collection and preservation for use will form a separate article.

The russa oil, the lemongrass oil, and the oil of citronella of commerce are obtained by distillation of grasses *Andrapogon Martini*, *Andropogon Citratus and Andropogon Nardus* respectively.

Bamboos are the poorman's timber. There are nearly 150 varieties all over the world and all of them are either growing in our country or capable of growing if introduced. While all timber trees are made use of mostly in construction of buildings the scope of bamboos is by far much wider. It makes a reliable walking stick for the gentleman, a fine oar for the boatman, a durable mast, spar or helm for the sailor, a strong shoulder pole for the carrier, a pleasant fishing rod for the sportsman, a successful bow for the hunter, an agreeable mouth organ for the musician, a fine milking pot for the village housemaid, an unbreakable toddy tube for the tapper and many other useful things which none of the other species can boast of or compete with. The Industry of bamboo fans, wall mats and other fancy articles made out of bamboos forms one of the sources of Japan's wealth. So much is bamboo valued in Japan that it is said that a few bamboo clumps are considered as a fairly big matrimonial dowry.

Industries using bamboos exist in the manufacture of baskets, mats, chicks, thattis, furniture, turnery works, picture and slate frames, fishing rods and paper manufacture. Large areas of bamboos are remaining unworked both in Madras and elsewhere and these can be utilised by successful establishment of paper-mills, and thus avoid the drain of nearly 3 crores, of rupees annually spent in the import of paper.

Tans and Dyes.—The value of import of dyeing and tanning substances amounted to 3·1 crores of rupees in 1938-39 and it goes on recurring. The tan fruits of Chebulic myrobalan, Babul pods, Beleric and Emblic myrobalanas, Divi-divi pods, Tan barks of *Cassia Auriculata*, *Cassia Fistula*, *Acacia Arabica*, *Acacia Catechu* from which the important dyeing agent *Cutch* is manufactured and many other trees exist in our forests which require harnessing and working under proper sylvicultural methods to be profitable and useful. Though the Aniline dyes have almost destroyed the value of most of the dye products of our country, a few such as the sapan wood (*Caesalpinia Sapan* used in calico-printing, dyeing wood and dyeing silk, the yellow dye of *Artogarpus Integrifolia* and *A. Lakoocha*, the root dyes of *Morinda Tinctoria* which is also called '*AL*' dye and the bark dyes *Terminatia Tomentosa* and *Ventilago Madraspatana*, the dye flowers of *Mallotus Philippinensis* (Kamala powder) the flower buds of *Acrocarpus Longifolius* (Suragi flowers), the 'ornatto' dye of *Bixa Orellana* and some others have still got their value, as the aniline dyes do not come up to their standard. It is upto our National Government to harness and develop these with a real patriotic fervour.

It may be remembered that about 17,000 tons of African wattle bark are imported into our country; this is obtained from *Acacia Decurrens* capable of growing in our country and fairly large scale plantations have already been established on the Nilgiris and with systematic continued planting, this drain can be stopped to our benefit.

Handmade Paper— Its Development In India.

Production Of Paper On Cottage Basis

By Sri. K. B. JOSHI

(*Concluded from April 1949 Issue*)

If the handmade paper Industry is to hold its high position, it should be developed on scientific lines. The utilisation of waste paper as a raw material should be discouraged as far as possible, its place being taken by the indigenous raw materials. The village artisan owing to his meagre resources and knowledge cannot be expected to improve the conditions of the industry unless he is given the necessary assistance, by way of dissemination of the technical knowledge on the subject and making available modified paper-making equipment like Hollander beater, calender etc. at reasonably cheap prices.

So far as this industry is concerned the All India Village Industries Association have tried to place this industry on scientific lines by introducing modern equipment to suit small-scale Industry. The work done by them has been incorporated in their publication on 'Paper-making as a cottage Industry' 1944. But over and above this, there is still need for more consolidated research for laying the solid foundations for both the categories of handmade paper viz., production of superior grades of paper and cottage paper-making. The nature of the problems to be further studied is—

Production of High-grade Handmade paper

The varieties of paper in this class are:—Documentary or Certificate paper popularly known as parchment paper; Account book paper; Currency note paper; Drawing papers similar to Whatman's drawing paper; Filter paper in different varieties. The superiority of the English handmade paper is due to the use of linen and cotton rags. The problems that require further study over and above what has been done are: Investigation of the fibrous plants similar in characteristics to to the linen fibre development of water marks in paper; fixing up on definite standards for the processes and products.

Besides these, the production of several varieties of filter papers offers a wide scope for research. Such papers are in great demand for chemical and industrial purposes. The chief varieties of such filter papers are:—Ashless filter papers, quick and slowing filter papers, acid treated papers, oil & coffee filter papers, papers for ordinary laboratory use.

NEWS AND NOTES

GOVERNMENT SILK FILATURES KOLLEGAL

(June 1949)

The factory was kept closed temporarily for want of cocoons. Due to the failure of Mungaru rains the cocoon crops were not heavy but subsequent showers helped the crops to spread over till the end of July, 1949. The keen competition for cocoons from charka reelers still continues and the filatures are not in a position to offer such high rates. Hence the estimated quantity of cocoon purchases could not be made and therefore the filatures still continue to be closed.

The total No. of workers who attended the factory during June and the amount of wages paid to them are as follows:—

Casual labour	Men	...	17
	Women	...	5
Regular category	Men	...	11
	Women	...	7
Wages	Casual labour	...	Rs. 287-2-0
	Regular category		Rs. 502-8-0

One woman got the maternity benefit of Rs. 24-8-0.

The filature employees co-operative stores is catering to the requirements of workers as well as to the staff satisfactorily. The factory dispensary is functioning satisfactorily and the total number of persons who got medical aid are as follows:

Men	...	166
Women	...	22
Children	...	30

DEVELOPMENT OF INDUSTRIES

Government's Work Explained

Mr. T. M. S. Mani, I. C. S., former Director of Industries, delivered a lecture on the 'Industrial Development of the Province., at the Crescent Society on 12th Aug. 49.

Mr. T. M. S. Mani said that the Government of Madras were doing their best to develop resources of the Province. Government had been encouraging people to start a number of new industries. But unfortunately the tendency of the people was to start some industry which had proved itself profitable and could be carried on successfully. Government were doing what they could to start new industries. They were running the Kollegal silk factory, ceramic factory in Gudur and a number of others and had thus paved the way for private enterprise. The idea was to show how profitable these industries were and encourage the investment of private capital. But one could not expect all the industries to be run by Government.

In the matter of capital, Mr. Mani claimed that compared with other provinces, Madras had done wonderfully well. The State Aid to Industries Act which was passed several years ago, but which was not enforced for a long time, had been utilised in this financial year. So far about Rs. 50 to 60 lakhs had been distributed as aid. Further the Provincial Government had also started the Industrial Finance Corporation with a huge capital.

Regarding capital equipment, Mr. Mani said that the Madras Government could not do anything independently of the Central Government in the matter. Besides this, Mr. Mani pointed out, there was shortage of capital goods the world over due to the devastating effect of the last war. There was also the dollar difficulty which stood in the way of imports.

Dealing with the question of raw materials, Mr. Mani said that no attempt was made to survey and exploit our mineral resources. The Geological Survey was extremely understaffed. "It might take some time to train our geologists", Mr. Mani said, and added that this province could boast of its high standard of technical education in subjects like civil and mechanical engineering, food and fisheries technology.

Mr. Mani observed that much of our capital was locked up in Burma, which if available, would be very useful. He also explained the futility of investing money on costly schemes. Giving a list of industries on which capital could be invested, Mr. Mani said that the manufacture of wires, type-writers, watches and clocks was best suited to this Province. The Province had ample resources for the manufacture of glass, and preparation of paints and varnishes. The Government, Mr. Mani concluded, would also render such help as may be necessary in this regard.

INDUSTRIAL UTILISATION OF MINERAL RESOURCES

THE HON'BLE THE MINISTER

Outlines Government Schemes

The Hon'ble Perumalswamy Reddiar, Minister for Industries, in a broadcast talk on "the Mineral wealth of the Province" emphasised the vital role of minerals in the development of industries. After a brief survey of the proved resources of the minerals in the Province, the Minister also outlined some Government schemes for the industrial utilisation of the mineral resources in the Province.

The Minister said: "Minerals form the chief sources of raw materials for modern industry, especially for those branches of the industry such as the metallurgical and heavy chemical industries on which all other industries are based.

"The occurrence of a number of important minerals in our Province has been known from time immemorial. We have in Sitarampuram, Visakhapatnam District, Apatite, a mineral which is the chief primary source of phosphorus. In the Tiruchirapalli District, we have in abundance Phosphatic Nodules which come under the same group as 'Apatite' and useful for the manufacture of various high-grade phosphatic chemicals. The Shevroy Hills contain rich deposits of Bauxite. Chromite is available in Sittampundi, Salem District. Good deposits also occur in the Kondapalli Hills of the Krishna District.

"Lignite or Brown coal has been discovered in Neyveli, South Arcot district. Coal occurs in Lingala—Totapalle near. Godavari Valley. Gypsum is available in large quantities in the Tiruchirapalli District. Iron ore occurs in Salem, Tiruchirapalli, Kurnool Districts and in Sandur. Limestone occurs in the Tirunelveli, Mathurai, Tiruchirapalli and Salem districts. Magnesite is available in the Salem district. Strontium minerals occur in the Tiruchirappalli district.

Three classes

"Minerals may be classified into three broad groups according to their industrial uses, viz., (1) Those used for the basic industries: (2) Those needed for building materials and consumer goods manufacturing industries and (3) those used in non-essential industries.

The first group, viz., basic industries, includes fuel, metallurgical, machine-building, heavy chemicals and fertiliser-manufacturing industries. The second group comprises the manufacture of cement, bricks, tiles, glass, paper, leather,

textiles, sugar, soap, oil-milling and other essential food industries. The manufacture of toilet goods, etc. comes under the third group.

Exploitation

"Consequent on the outbreak of the last war and the needs of the growing industries of this Province in the post-war period, the production of minerals has been steadily on the increase. But the exploitation of the minerals cannot be expected to develop until quantitative surveys made by the Geological Survey of India have revealed the extent of the deposits.'

Even after the establishment of the extent of the mineral deposits, the exploitation of the minerals has, in some cases, to await the solution of some technical difficulty or other before the industries can be established.

For example, the smelting of iron-ore to produce iron and steel requires high grade coke. But this Province does not possess any known deposits of coal suitable for the manufacture of such high grade coke. Electric smelting of the iron-ore has been suggested, but this process depends for economic success on the availability of a cheap source of electric power and of some form of fuel, such as charcoal or coke to reduce the ore in the furnace.

"The discovery of large deposits of lignite in this Province leads one to hope that this may be used not only for the reduction of iron-ore in the electric furnace in place of charcoal or coke but also as a source of cheap electric power. The exploitation of iron-ore deposits in this Province, has, therefore, to await the solution of the problem of the utilisation of the locally available lignite for the smelting of the ore and for production of cheap electric power," he said.

Utilisation

Referring to certain investigations in progress for the industrial utilisation of the mineral resources of the province, he said: "The utilisation of Phosphatic nodules for the production of fertilisers is being investigated, and a scheme for the production of a suitable form of fertiliser with this mineral will soon be formulated. The possibility of improving the quality of Graphite mined in this Province to make it better suited for the production of lead pencils and refractory crucibles is also under investigation.

"Technical information is also being collected, and a detailed scheme is also under preparation for the manufacture of magnesium from the Salem Magnesite. The possibilities of manufacture of aluminium from the Bauxite available in Salem are also under investigation, and if these investigations are successful, a plant is likely to be established at Salem for the manufacture of aluminium."

It is learnt that a factory is being constructed for the manufacture of Micanite from the Mica mined in this Province, and if this is established the Mica mining industry, which is at present solely dependent on the export market, will be greatly benefited. The Soda-Ash and Caustic Soda industries have also enormous scope for development in this Province.

"With the further growth of industries, the possibilities of using the several minerals will increase and multiply," he said.

PROMOTING COTTAGE INDUSTRIES

Jap Machinery to be Utilised

The Two-man Mission sent out by the Government of India to Japan some time ago to purchase machinery for cottage and small-scale industries for use in work centres for displaced persons, has returned to Delhi after placing orders for machinery of about fifty different kinds. The Mission consisted of Mr. N. C. Srivastava, Deputy Secretary, Ministry of Rehabilitation, and Mr. Chaman Lal, Member, All-India Cottage Industries Board, representing the Ministry of Industry and Supply.

The Ministry of Industry and Supply, which was interested in the Mission's work from the long-term aspect of popularising small-scale industries in the country, is understood to be considering the setting up of a central technical institute at Delhi with branches in the provinces. Some of the machinery, will be installed at these centres and will be utilised for practical demonstration for all those who are interested.

The Mission selected six Japanese who will help in installing the machinery which has been ordered, and training Indian workers in their use. One of the six technicians is the President of the Tokyo Toy Makers' Association and is himself running more than twelve toymaking plants in Japan. Another member of this party is the in-ventor of the Bambania process, by which bamboo is boiled and pressed and converted into sheets for making panels, ceilings, mosaics, etc.

The Mission is at present preparing its report which will be submitted shortly to the Ministries of Rehabilitation and Industry and Supply. The report will contain recommendations for the starting of several new cottage and small-scale industries in India with small capital.

The Mission stayed in Japan in all for 63 days. They toured the mainland of Japan and her islands extensively and visited over one hundred small industries and "home factories" where members of one family work in one of the rooms of their house. The Mission received full co-operation and help from the Military Government, the Japanese Government, the Chambers of Commerce and the Foreign Trade Institute.

Members of the Mission presented about thirty beautifully-framed copies of a portrait of Mahatma Gandhi by the famous artist, Nand Lal Bose. Copies were presented, among others, to General MacArthur, various Governors, Mayors, etc. Some copies were also presented to town halls and one to the Peace Memorial Hall at Hiroshima.

Among the machineries ordered by the Mission are some for the manufacture of bamboo articles like buttons and knitting needles, mechanical toys from scrap tin and used cans, manufacture of new cloth from old rags, braids, nail-making machines which can make 200 nails per minute, latest designs of oil-expellers automatic needle looms, different types of spinning wheels, etc.

Machinery for these small-scale industries will be installed in camps and townships for displaced persons and will provide employment to a large number of persons. The machinery has been brought on an experimental basis. After gaining experience of its working more units will be ordered.

INDUSTRIES IN INDIA

Upward Trend in Production

Govt's Memorandum to Advisory Council

EXCEPT in certain minor industries, an upward trend in Indian industrial production has been maintained during the first half of 1949, as compared with the production in the corresponding period last year, according to the memorandum submitted by the Industry and Supply Ministry to the meeting of the Central Advisory Council of Industries.

The memorandum reviews industrial production during the first half of 1949, describes the changes in the system of distribution of controlled commodities, and gives a general picture of the state of industry in order to assist the deliberations of the second meeting of the Central Advisory Council of Industries.

The agenda for the two-day session of the Council includes general discussion with particular reference to the trends of production during the first half of 1949 and the effects of recent measures taken to encourage it.

Besides discussing the Industries (Development and Control) Bill, 1949, the Council will also review the transport position in relation to industry, export and import problems specially affecting industrial production, and the working of controls.

The Council will consider specific recommendations of the Development Committee and suggestions sent by members and form a standing committee.

Dr. Shyama Prasad Mookherjee, Minister for Supply and Industry, will deliver an opening address to the Council.

Although the production of cloth has decreased by 110 million yards, as compared with the production of the first half of last year, there is a substantial increase in the production for the same period this year in coal, steel, cement, paper, yarn, tea, sugar and salt.

The comparative statement showing the production figures of some commodities for the first halves of 1948 and 1949 is as follows:

		1948	1949
Coal (in tons)	...	15,528,760	15,546,069
Steel ,,	...	426,300	442,943
Cement ,,	...	750,290	958,051
Paper ,,	...	47,448	51,324
Cloth (in yards)	...	2,706,673,800	1,996,602,000
Yarn (in lbs.)	...	690,616,000	763,405,200

Distribution of Steel and Cement

With regard to the control and distribution of steel, the only change effected since January, 1949, is that the control of distribution of wire nails has been relaxed temporarily as its supply position has become easier due to large imports during 1948. The association of provincial Governments in the process of distribution which was introduced in 1948 is having the desired effect, and most of the provinces are exercising the powers conferred on them for rooting out corruption and blackmarketing, says the memorandum.

With regard to cement, the Government have accepted the recommendations of the Conference held in May of the representatives of the Provincial Governments and Regional Cement Advisers for a revised scheme of distribution. Under this scheme, the allocation of cement will be made quarterly—about a month before the quarter begins. An estimate will be made of total quantities available for allocation on the basis of expected production, arrears of order, and stocks. At the same time, an assessment will be made of demands of various classes of consumers. The demands have been classified into two categories—Central and Provincial or State. The Central quota has been sub-divided into Government requirements, and private requirements including export. Government have decided to allow movement of imported cement to inland areas from port areas which have not been able to absorb the entire imported quantities.

NATIONALISATION OF INDUSTRIES

Prime Minister on Govt's Attitude Need for Stepping up Production

Asked at his Press Conference whether Government's policy on nationalisation of key industries was not standing in the way of foreign investments in India, Pandit Jawaharlal Nehru, Prime Minister, said: "What the Government of India have said is not that we will do this or do that after ten years. What we said was that we would not nationalise certain industries for ten years. It was a negative attitude and not a positive one."

Nationalisation was not the solvent of various ills, Pandit Nehru said. Much more important than nationalisation was greater production. "If nationalisation would increase our production, we will have it. If it does not, we shall not have it," he said and added that the deciding factor was whether it would increase production or not.

The Prime Minister explained that nationalisation of certain industries meant the State buying up private industries and plant and paying compensation for it. He said that it was not wise to lock-up money in those industries unless it meant greater production.

Pandit Nehru said: "We feel it is far wiser to employ our money in new ventures. We feel it is far better to leave the present plant as they are and use all the available sources in new ventures—State-owned or partially State-owned. Suppose the Government nationalised the present industries, not only had the State to tie up a large amount of money, but production would be exactly the same. Owing to rapid changes in technology, before the construction of a plant was complete, it became obsolete. Why acquire out-of-date plant and put their money in it. If they had money, they should build new plants. Nevertheless, each case had to be dealt with on merit on consideration whether the taking up of the plant would mean an increase in production or not. The policy should not be automatic nationalisation, whether it was good or not.

"Too Busy with other things"

"With regard to the key industries which the Government feel should be State-owned," Pandit Nehru said, "we are committed not to nationalise them for ten years." He added: "Frankly speaking, we have not got the resources to do it and we are too busy with other things also. Even after ten years, we may not nationalise them. But at any moment if an industry fails due to incompetence, or other reasons, we shall intervene." So far as foreign industries were concerned, he said, that they would be governed by special arrangements with them.

Referring to economic policy, Pandit Nehru said that the country was involved in a vicious circle of higher prices and higher wages. It was obvious that unless the productive capacity was increased, India could not compete with other countries, nor could it be possible to bring down the prices. It was also obvious that wages could not be lowered. Greater production could be achieved only by increasing the productive capacity of labour and the plant along with the introduction of rationalised schemes. Normally, labour had been opposed to rationalisation because it would lead to unemployment but there was no way out, except rationalisation. The Government must look after the workers who might be thrown out of employment and the Government could do it. Everyone and labour must recognise the fact that "we have to rationalise as we have to increase the output and reduce the cost of commodities."

Pandit Nehru reported a "progressive decline" in labour trouble in the last two years.

Pandit Nehru described the discovery of water in the middle of the desert in Rajputana ten to twelve feet below the ground as "dramatic" and said that within the next six months, Government hoped to turn 12,0000 acres of desert into farmland.

DEVELOPMENT OF INDUSTRIES

Govt. to seek assistance of foreign experts

The Government of India will shortly engage a team of American and British technical experts for implementing various projects for the development of Indian industries.

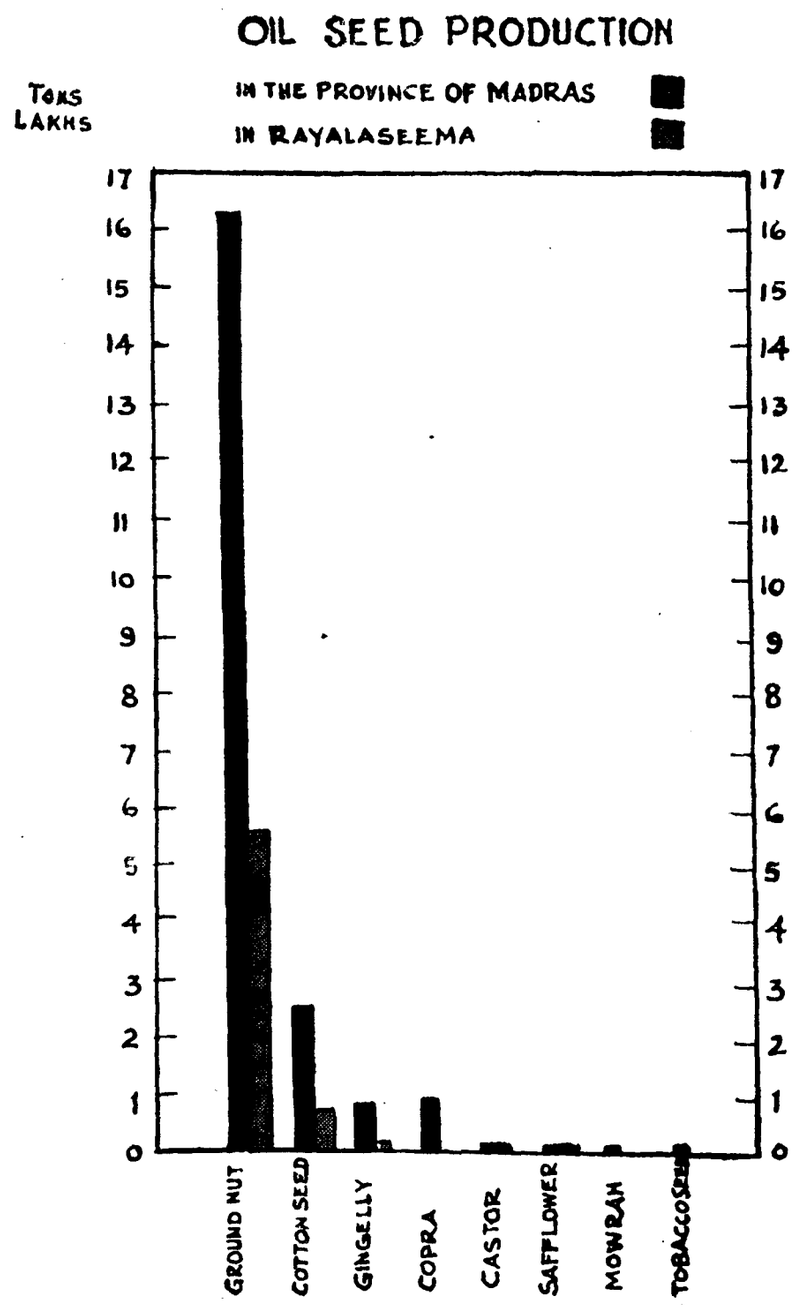
Dr. J. C. Ghosh, Director-General of Industry and Supply, Government of India, who left Bombay by air for London, told the *Press Trust of India* that during his five days' stay there, he would meet various industrialists with whom the Government of India were negotiating for technical assistance in setting up industries in India.

Dr. Ghosh, who is a member of the seven-man Indian delegation to the United Nations Scientific Conference on Conservation and Utilisation of Resources, held at Lake Success on August 17, said that he would also select a team of American technical experts for technical institutions in India. He will also visit important American industrial establishments.

Dr. Ghosh will visit Frankfurt and discuss with Allied Occupation officials in Germany the question of acquiring some German industrial plants for India.

From Frankfurt Dr. Ghosh will fly to Copenhagen to take part in the annual meeting of the International Scientific Union and later proceed to Paris to attend the UNESCO meetings.

Dr. Ghosh is expected to return to India in October.



THE OIL TECHNOLOGICAL INSTITUTE, ANANTAPUR

The foundation-stone of the above Institute was laid by The Hon'ble H. Sitarama Reddy, Minister for Revenue and Labour, Govt. of Madras on the 26th of August 1949

MADRAS GOVERNMENT'S NEW PROJECT

Need for an Oil Technological Institute

The Madras Province accounts for about 50·5% of groundnut, 20·4% of gingelly, 38·7% of copra, 17·9% of castor, and 12·5% of cottonseed production in India. Having regard to the importance of oil seeds in the economy of this Province, it has been considered necessary to set up an Oil Technological Institute to deal with the various problems connected with oil industries and to train apprentices leading to a diploma course in oil technology.

Scope of the Institute

It is proposed to undertake research work on the following subjects:—

(*a*) Cottonseed oil milling and refining.
(*b*) Improvements in oil milling and refining processes.
(*c*) Extraction of oils by solvents from seeds and cakes.
(*d*) Fat splitting and manufacture of fatty acids and their metallic compounds.
(*e*) Sulphonated oils and other detergents.
(*f*) Manufacture of groundnut butter from groundnuts.
(*g*) Paints, varnishes, and drying oils.
(*h*) Essential oils—preparation of concentrates, isolates, and synthetics.
(*i*) Soaps—improvements in soap technology.
(*j*) Plastics—preparation of plastic powders and moulding.
(*k*) Vegetable oil lubricants and greases.
(*l*) Cracking of vegetable oils for making motor spirit.

The Building and Equipment

The building for the institute will be a two-storeyed building designed on modern lines. The library, workshops, store rooms, students' laboratory, and the pilot plant will be located in the ground floor and the staff rooms, office, lecture halls and the research laboratory in the first floor.

The research laboratory and the special pilot laboratory will be equipped with up-to-date apparatus and equipment and will contain necessary services.

Personnel

Director	..	1
Research Officer	..	1
Chemical Engineer	..	1
Scientific Staff	..	10
Technical Staff	..	6
Ministerial Staff	..	6
Inferior Staff	..	5
Total	..	30

Finance

The financial implications of the scheme have been roughly estimated as follows:—

	Rs.
Land and Buildings	3,37,450
Electrical Installation and Water Supply	21,000
Apparatus and Equipment	52,400
Books and Furniture	19,000
Total	29,850

Recurring expenditure:—

	Rs.
Staff	33,000
Equipment, books and periodicals and contingencies ..	16,400
Total ..	49,400

Industrial possibilities of Oils

Many oils are capable of being used for industrial purposes after treating them chemically or otherwise or after converting them into different materials. Though at the present moment the edible oils are mainly required for food purposes, it may not be long before these oils will be found surplus after meeting the food requirements of our country and abroad, due to the competition from other parts of the world. It would, therefore, be necessary to study in advance the future possibilities of economic utilisation of these oils in other fields. For instance, castor oil can be converted into dehydrated castor oil and can be used as a drying oil in paints and varnishes. Similarly, safflower (kusuma) oil can be used as a drying oil in paints and varnishes more profitably than for edible or burning purposes. Government of Madras conducted research into the uses of kusuma oil for the paint industry and have already issued a press communique about the results of their study. Coconut oil can be used after preparing the fatty acids from it in the manufacture of detergents and wetting agents. It is, therefore, obvious that our oil seeds and the oils therefrom can be used by converting them into products of industrial application, wherever possible.

Cottonseeds Oils Milling

It is estimated that our Province produces in normal crop years roughly about 250,000 tons of cotton seed annually (average of 1940-41 to 1944-45). The seed is at present used directly for cattle feeding though it is fairly well established that the cattle do not need all the oil in the seed for body building. In fact, a large part of the fat in the cotton seed is thrown out by the animal unassimilated. And the oil cake from cotton seed is more nutritious for the animal than the whole seed, as it contains less oil (but sufficient for the good growth of the animal) and more than double the amount of protein than is present in the whole cotton seed. Therefore, in all Western countries where the seed is produced in quantity, it is crushed for the oil. In America, over 80 per cent of the seed produced is crushed and good edible cotton seed oil and other valuable bye-products worth several hundred million dollars are produced annually. The same can and should be done in our country also. Even if three-quarters of the cotton seed produced in our Province is crushed efficiently, it is estimated that about 28,000 tons of oil valued at nearly 4 crores of rupees can be produced annually in addition to the valuable bye-products. However, it is desirable to investigate the problem in detail and obtain technical and other data on the various aspects and operations of the cotton seed milling industry, at the Oil Technological Institute to be established here.

Condition of Oilseed Milling in the Province

The present condition of oil seed milling in our Province cannot be said to be efficient, by any means. While in the industrially more advanced countries, particularly in America, only between 4—5 per cent oil (by weight of cake) is left in the cake of any oil seed, in our country 7—10 per cent (or even more) oil is left in the cake when crushed by expellers and even higher percentage of oil are left in the cake when crushed by rotary power mills or country ghannies. By the introduction of modern and efficient methods of oil milling, both the yield and quality of oils from the oil seeds will be considerably improved. Taking the examples of groundnut, copra and castor seed milling, the following increase in the yields of oil can be anticipated. If the present estimated quantities of these three oil seeds are crushed by efficient methods using quality expellers a total quantity of about 52,000 tons more of the oils valued at about 8 crores of rupees can be produced. By using solvent extraction methods instead, a total quantity of about 66,000 tons of these oils valued at about 10 crores of rupees can be produced. These examples are given just to illustrate how much behindhand our methods of oil milling are and what could be achieved by improving these methods.

In suggesting that the present oil milling industry should be improved on the efficient modern lines indicated above, it does not follow that the present milling by ghannies should be given up altogether. As there is a preference by a section of people for oils made by ghannies and as the latter have a useful part to play in the village economy and the development of cottage industries, they can exist along with the expeller milling. Even in these cases, the oil cake obtained in the milling by ghannies can be collected at a central place and oil can be taken out from it by other more efficient methods particularly by the modern solvent extraction process.

It may also be felt in some quarters that since the oil cakes produced in efficient milling operations do not have the same amount of oil but much less, the cakes may not be as nutritious for animal feed as the other cakes containing more oil. In this connection, it may be pointed out that feeding experiments conducted and feeding practices followed in the more advanced Western countries where cattle wealth is preserved better than our own revealed that for the nutrition of the animal, only very small quantities of certain unsaturated fats will adequately meet the fat requirements of the animal. Again, in the case of oil cakes like castor cake and tobacco seed cake which are unsuitable for animal feed but which are used as fertilisers for soil, the less their oil content, the better they are assimilaed by the soil.

Storage of Oilseeds and Oils

It is well known that oil seeds and crude or refined vegetable oils when stored under condition of excessive moisture and heat, deteriorate rapidly in quality. That is how if oil seeds are stored carelessly for any length of time, the oil in them increases in its free fatty acid content and becomes even rancid sometimes. If the crude oils are similarly stored, without proper care, they also increase in free fatty acids and get rancid which is hard to remove. Oilseeds or oils stored under such conditions are not conducive to good health if they are consumed as such and will give heavy refining losses in the process of purification involving in value huge amounts of money. Another important aspect of this question is the bad name and discount in trade our oil seeds and crude oils will have when these are exported abroad and the resulting adverse effect it will have on the export trade of our oil seeds and oils.

However, the quality of the seeds and oils can be prevented from deteriorating if they are stored under proper conditions of moisture, temperature, and other factors. Similarly, by adding very small amounts of certain materials called anti-oxidants, the crude or the refined oils can be prevented for a longer time from deteriorating in quality on keeping. A lot of work has been done already on the storage of oil seeds and preservation of oils elsewhere but a lot more has yet to be done particularly with special reference to the conditions prevalent in our part of the country.

Oil Processing Methods

In the field of refining of oils also our oil processing industry is behindhand. The continuous centrifugal refining resulting in the saving of 15—40 per cent of the refining losses involved in the conventional kettle method and, therefore, so widely adopted in America has materially improved the economics of the refining process. Not a single plant in India is known to have yet adopted this continuous process now in use for nearly 15 years in U.S.A. Further, there are material improvements in the field of continuous processes of bleaching, hardening, and deodorising being put into effect in U.S.A. and U.K. The margarine (artificial butter) industry in the West though similar in principle to vanaspathi industry in our country is yet so different in that the product is made much more nutritious by the incorporation in it of the much-needed vitamins and butter flavour to improve the taste. Therefore, the margarine industry has established itself firmly in the West. The vanaspathi industry, if it is to serve the purpose of supplying a nutritious food supplement to the diet of the average Indian, has to be considerably improved in quality and be subject to strict control methods of the laboratory.

Fatty acids

A few well-known fatty acids are contained abundantly in the common oils and fats. These fatty acids have a very wide range of industrial application and are,

THE SPEECH OF

The Hon'ble the Minister for Industries on the occasion of the laying of the foundation stone of the Institute

LADIES AND GENTLEMEN,

I thank you all very sincerely for coming here to participate in the function of the laying of the Foundation-Stone of the Oil Technological Institute, Anantapur. It will be of interest to you if, on this occasion, I recapitulate what led to our decision to locate the Institute here. It was originally intended to set up the Institute at Calicut, so that the Government Soap Factory already established there could serve as a valuable adjunct to the Institute providing necessary facilities for the training of the students of the Institute in soap technology. A reconsideration of this proposal was undertaken as a result of the intervention of my old friend Mr. Kalluri Subba Rao. His main contention was that the Ceded Districts were very rich in a variety of oil bearing seeds, and that as the development of oil industries would go a long way to reduce the incidence of famine in these districts, it was essential that the Institute should be located in Rayalaseema. On merits it was difficult to resist these arguments; and since Mr. Subba Rao was thus the chief protagonist responsible for the change of venue of the Institute, it was inevitable that the place eventually chosen in the Ceded Districts for the location of the Institute should be Anantapur, the district from which Mr. Subba Rao hails. I think I should also mention here that when the final decision to locate the Institute in Anantapur was taken, it was a fruitful circumstance that our Rayalaseema kinsman Mr. Seetarama Reddy happened to be the Minister in charge of the portfolio of Industries. You will therefore agree with me that it is singularly appropriate that Mr. Seetarama Reddy himself should today be laying the Foundation-Stone of this Institute. Before I request Mr. Seetarama Reddy to perform the ceremony of laying the Foundation-Stone of the Institute, I should like to utilize this opportunity to make an observation or two on the Institute in particular and the development of Rayalaseema in general. In the brochure submitted to you, the Director of Industries outlined briefly the objectives underlying the Institute, its constitution and its scheme of work. I will not therefore expatiate on these aspects of the Institute. I must however mention that this Institute has been designed on the lines of the best technological laboratories of the West; and I hope it will be possible to complete the construction of the buildings before the close of the first half year of 1950, so that we could be in a position to inaugurate the first session of the Institute in the latter half of 1950. I feel proud to note that this Institute is the first of its kind in India, but I also feel that its advent has been long overdue. Only to the extent that our research laboratories can become foremost in the discovery of the secrets of nature and the evolution of new technological processes, can we hope to win the race of industrial development, notwithstanding that our start has been delayed by several decades due to foreign rule. And it is on this front no less than any other that closest collaboration between Government and industry will have to be fostered. The primary responsibility for the establishment of research institutes may rest with Government, but as their effectiveness will have to be assessed with reference to the extent to which they are able to provide solutions to the problems of industry, I cannot too strongly urge the need of industry taking the utmost interest in the welfare of the Research Institutes. The Oil Technological Institute, Anantapur, is intended to subserve the interests of oil industry throughout the country and our intention is to provide facilities in the Institute for training students belonging not only to this Province, but also those coming from other Provinces and States. I would therefore appeal to all industrialists connected with oil industry in our country to lend their cooperation to this Institute in order that it may serve their interests as effectively as possible.

I must not miss this opportunity to reiterate that the Government of Madras remain firmly resolved to take all necessary measures to redeem the economic backwardness of Rayalaseema as expeditiously as

possible. Rayalaseema is our granary of oil seeds, particularly groundnut and castor. On the exploitation of its resources in oil seeds and minerals must therefore depend the realization of the economic potentialities of Rayalaseema. It is in the industrial, more than in the purely agricultural sphere, that the chances of speedy development of Rayalaseema seem brightest. I would therefore appeal to the Rayalaseema Development Board that is now being constituted in replacement of the old Ceded Districts Economic Development Board, to concentrate its attention on the industrial development of oil seeds and minerals which the Rayalaseema tracts so richly abound in. For my part, I have no hesitation in giving the assistance that all schemes for the industrial development of Rayalaseema will receive most earnest consideration.

I now, with great pleasure, request my colleague, Mr. Seetarama Reddy, to lay the Foundation-Stone of the Institute.

The Hon'ble H. Sitarama Reddi's Speech.

To-day we are launching on a new project which, I hope, will partly realise the economic advancement of our Province. The institution which is being established here will be able to cater not only to the solution of the problems of oil industry in Rayalaseema but our Province as a whole. Perhaps it is the first of its kind undertaken by a Provincial Government or State in India.

The need for technological study and research has been recognised all over the world and special attention has been paid for several decades in every part of the world to this aspect of our country's economy. After the attainment of INDEPENDENCE, the Government of India has been devoting very great care and attention to the field of Scientific Research and Technological development as is evidenced by the activities of the Council of Scientific and Industrial Research and the establishment of various National Laboratories and Technological Institutions. The Government of India, under the leadership of Pandit Nehru, has spared no effort to allocate generously funds needed for this purpose. When these institutions, which are in the course of construction in the various parts of India, have begun to function, India will be equipped with laboratories, pilot plants and research workers, who can be compared favourably with some of the advanced countries of the world. Madras has been fortunate in that to have two important National Institutions, viz., Leather Technology Institute and Electro-Chemical Institute which have been approved for location in the Madras Presidency and foundation-stones for the two institutions were laid by Dr. Shyamaprasad Mookherji, and Pandit Nehru, respectively.

Madras has a proud place in the production of oil seeds in India. Groundnut which to-day occupies a dominant place in the supply of fats to the people of the world, is grown in very large quantities in the Madras Province. About four million acres is under groundnut in our Province and Rayalaseema has nearly 17 lakhs of acres of the total. Other important oil resources are the copra, gingelly, cotton seed, castor and a few others. In view of the large output of oil seeds and oils in our Presidency, it was felt necessary that there should be an institution which will help to study the various problems relating to the production and processing of oils and help the industry and the people of our Province.

Uses of the Oils available in the Province

The present uses in India of most of the oils from oil seeds are well known. For instance, the bulk of groundnut, gingelly and coconut oils produced is consumed for cooking and other edible purposes—groundnut oil either as such or as vanaspathi. Coconut oil is also used in bulk in soap manufacture. Castor oil is used in this country for medicinal purposes, as an industrial lubricant and for lighting purposes and to some extent in the manufacture of turkey red oil used in textile dyeing. Safflower oil, otherwise known as kusuma oil, is largely used for culinary purposes, as an adulterant of ghee and gingelly oil. Mowrah fat is used mainly in the soap manufacture. Tobacco seed oil is used in paints and varnishes, and soap making. Neem or vep oil besides being used for medicinal purposes, is used in the manufacture of medicated soaps.

therefore, manufactured from the cheaper grades of oils in enormous quantities elsewhere. The usual method of manufacture is the splitting of fats into their components by well-known processes and then distilling the mixture for separation of individual fatty acids. I understand that we have not yet taken advantage of this processing in this Province or in other parts of the country.

The Technological Institute will have several economic problems to tackle. The progress of the work of the Institute will depend upon the co-operation that it receives from the industry and the public and the zeal with which those that are in charge of the institution take to the work. It is for the industry to take full advantage of the institute and I am sure the various enlightened industrialists connected with the oil industry will appreciate this measure of technical help rendered by the Government in the service of industry. It is well known that the industry itself establishes such institutions and conducts elaborate research. It is now up to the industry to come forward with their own quota of financial contribution to develop the institution from strength to strength. Research is a difficult and arduous job which may not always yield immediate benefits. But we should all bear in mind that some of the marvellous results and benefits achieved in industry have been the result of patient and long-drawn research.

I am indeed grateful for the opportunity that I have had to associate myself with the function by having the privilege of laying the foundation-stone of an INSTITUTE which I pray may be the symbol of steady progress for the economic development of Rayalaseema.

GOVERNMENT'S HELP TO INDUSTRIES

Increased Research Facilities

By

The Hon'ble C. Perumalswami Reddi

MINISTER FOR INDUSTRIES

The Industries Department renders assistance to existing industrial units in the Province to maintain and expand production. It examines and makes recommendations to the appropriate authorities on all applications from industrial concerns for the supply of raw materials which are in short supply and subject to some form or other of Government control, such as iron, steel, coal, cement and cloth. Under the provisions of the Madras State Aid to Industries Act, financial assistance to deserving industries is also granted.

Development of Cottage Industries

This department gives all possible assistance for the development of cottage industries in this Province. The Director of Industries and Commerce is empowered to sanction loans and subsidies to cottage industries up to a maximum of Rs. 500.

Ceramic service centres are being set up at Gudur, Rajahmundry, Dhone, Pappinissery and Cuddalore for the benefit of potters in those areas. A service centre is also being set up at Gudur for the supply of block glass to cottage manufacturers of bangles and beads. The Kerala Soap Institute, the Government Oil Factory, Calicut, the Government Silk Filatures, Kollegal, the Ceramic Factory, Gudur, and the Andhra Paper Mills, Rajahmundry, are run as models for demonstration to the public and also to serve as training grounds for skilled workmen and supervisory personnel for similar units elsewhere.

Eight Polytechnical Institutions are being run at Madras, Madura, Coimbatore, Calicut, Mangalore, Bellary, Vuyyuru and Cocanada. Besides, specialised institutions are also run to impart instruction and training in particular subjects, and a few of them are:

The Government Textile Institute, the Institute of Leather Technology, and the School of Arts and Crafts, Madras.

Industrial Research

All the model industrial units run by the Department serve as centres for conducting research work pertaining to the industries carried on therein.

The Department is running a separate skeleton laboratory at Madras for the analysis and testing of various minerals discovered in the Province, and is also establishing a separate Oil Technological Institute at Anantapur to conduct research in vegetable oils and fats.

The Industrial Engineering Section is equipped for opening bore-wells and installing pumping sets for irrigation. About 20,000 bore-wells have been sunk in this Province. About 250 artesian springs have been tapped, mainly in South Arcot, West Godavari and East Godavari Districts. The Government have recently sanctioned the sinking of twenty artesian wells in South Arcot District for tube well irrigation.

Textile Control

In August 1948, the Government of India reintroduced control over cotton textiles and promulgated the Cotton Textiles (Control) Order, 1948. Under this control, the Central Government distribute to Provinces and States mill cloth and yarn according to quotas fixed. They also fix fair prices of cloth and yarn ex-mill and such prices are stamped on all cloth and yarn.

The Provincial Government fix the margins of profit to dealers in their Province within the maximum prescribed by the Central Government, and arrange for the distribution of cloth and yarn within the province through trade channels and through cooperative societies.

The major portion of the mill cloth quota of this Province comes from Bombay surplus area. The goods are delivered by the mills at their premises to representative buyers nominated by this Government. After taking delivery of cloth at that end, representative buyers book the goods to the wholesale consignees in each district, according to the quotas fixed for that district by the Provincial Textile Commissioner.

The cloth quota for the whole Province is distributed among the districts on the population basis.

Wholesale consignees in the district receive the entire allotment of cloth for the district and distribute it among wholesalers.

The wholesalers in their turn distribute the cloth among retailers.

The number of dealers in cloth is worked out at the rate of one wholesale dealer for about 100,000 of the popuation in the district and one retail dealer for every 5,000 of the population. On this basis, a wholesaler gets about 15 bales a month and a retailer ¾ of a bale a month.

Mills in this Province and outside send yarn direct to wholesalers in this Province linked to them.

One yarn dealer for 200 looms

The number of dealers in yarn is worked out at the rate of one wholesaler for 15 bales of the quota allotted for the district and one retailer to serve approximately 150 to 200 looms. On this basis a retailer gets about five bales a month. All dealers are selected by Collectors.

There is, however, no control over prices of distribution of foreign cloth or yarn. But foreign cloth and yarn should be sold only through licensed dealers.

In view of the increased production of cloth and yarn at the producing centres, the Central Government have enhanced the quota for this Province. Consequently the policy governing the grant of cloth and yarn licences which was very strict in the beginning, has been liberalised and dealers who were refused licences at the beginning of the Control are being absorbed into the trade.

Supply of Iron and Steel

The Government of India have been allotting to this Province quarterly quotas of standard iron and steel, scrap iron and pipes and fittings. The quota of standard steel allotted for agricultural purposes is distributed on the recommendations of the Agricultural Department.

The non-agricultural quota of about 2,000 tons per quarter is distributed for the normal maintenance demands of buildings and roads of the Public Works Department, municipalities and local boards and general public, including small-scale manufacturers of consumer goods, on permits issued by the Director of Controlled Commodities on the recommendations of the appropriate authorities. Maximum releases have been fixed for various purposes.

Permits for pipes

The quarterly quota of about 150,000 feet of pipes with fittings is also distributed on permits issued by the Director of Controlled Commodities on essentiality certificates granted by the Secretary to Government, Development Department, or by Collectors for domestic purposes, up to 200 feet in each case. To advise the Director in the distribution, there is a representative Steel Advisory Board.

The requirements of iron and steel for processing industries, industrial maintenance and packing, private industrial developmet, Government development schemes and Government-sponsored housing schemes, are met by the Government of India direct on the recommendations of the Provincial authority. The supply position of iron and steel, is very acute owing to world shortage.

The Government of India are doing their best to allot as much iron and steel as is possible from all available sources, i.e., indigenous production and imports.

The Madras Government are taking all possible steps to see that the limited allotments are distributed as equitably as possible.

Coal and Coke

The Government of India have set up a special organisation at Calcutta, with a Coal Commissioner functioning as head of the organisation, to deal with the procurements and distribution of coal and coke throughout India in consultation with the Provincial Coal Controllers. The Director of Controlled Commodities, Madras, functions as the [illegible] Coal Controller of this Province. [illegible] of allotment and supply of [illegible]tries have been divided into two groups: large-scale industries for which the Coal Commissioner arranges supplies directly, and other industries of Provincial importance which obtain supplies through the Provincial Coal Controller, who has been given by the Coal Commissioner a fixed quota under the various classes of industries like brick industry, glass industry, potteries, etc.

Supplies from Collieries

Out of these classes, industries and other concerns, which consume coal and coke in wagon loads obtain the supplies direct from the collieries on the recommendations of the Provincial Coal Controller and on the sanctions issued by the Deputy Coal Commissioner, Calcutta.

Industries whose requirements are comparatively small and less than a wagon load, obtain their supplies from local depot holders approved by the Provincial Coal Controller and those dealers release coal and coke to small industries against permits and quotas issued by Provincial Coal Controller. Apart from the abovementioned class of industries, the Deputy Coal Commissioner places every year about 10,000 tons at the disposal of the Provincial Coal Controller for distribution to the tobacco curing industry in Krishna and Guntur districts.

Every effort is being taken to see that the industries in this Province do not suffer for want of coal or coke.

Paper Control

Under the existing orders dealers in Indian mill-made paper are required to set apart as reserve in writing, printing and art paper, 50 per cent, 40 per cent and 10 per cent, respectively, subject to a maximum of five tons, for distribution under instructions from the Director of Controlled Commodities. Restrictions on the movement of paper (except waterproof paper and boards including straw boards) from this Province to places outside it imposed in April 1948 still continue.

Consequent on the liberalised import policy of the Government of India, there has been a great influx of imported paper. There is also no restriction on the movement and distribution of imported paper.

During 1948-49 various mills in India sent in all 4,390 tons of paper against a quota of 8,814 tons, out of which 85 tons of paper were exported outside the Province. Permission was granted for the operation of 209 printing presses in this Province during 1948-49. Permission to publish books, etc., was given to 95 applicants. Prosecution was sanctioned in six cases for contravention of Paper Control Orders.

NOTEWORTHY BORE WELLS.

Completed by the Industries Department.

COIMBATORE DISTRICT—

Vedapatti village:

In a 4" diameter boring put down in a well 34' deep, to a depth of 110'-0" from ground level good springs were tapped at 80' and 97' below ground level as a result of which the water level in the well rose by 4'. The well gives a discharge of 7,200 gallons per hour at 28' from ground level. The approximate cost of boring is Rs. 1,200.

CHINGLEPUT DISTRICT—

Elvam Pedu village:

In a 6" diameter boring put down in a well 23' deep, to a depth of 65'-0" from ground level; good springs have been tapped at 59'-0" from ground level as a result of which the water level rose by 4'. The yield of the well is 10,800 gallons per hour at 20'-0" from ground level. The approximate cost of boring to the party is Rs. 440 and about 8 acres of land will be benefited.

Ramareddipalayam:

In a 6" diameter boring put down in a well 23' deep, to a depth of 95' from ground level good springs have been tapped at 94'-6" from ground level. The well gives a discharge of 10,800 gallons per hour at 16' from ground level. The approximate cost of the boring to the party is Rs. 107 and about 12 acres of land will be benefited.

SOUTH ARCOT DISTRICT—

Cuddalore taluk:

In a 6" boring put down in a well 14' deep, to a depth of 46'-0" good springs have been tapped at a depth of 40'-0" from ground level. The well gives a discharge of 10,800 gallons per hour at 14' from ground level. The approximate cost of boring is Rs. 150 and about 13 acres of land will be benefited.

Villupuram taluk:

In Soranavoor village a 6" boring was put down in a well 32' deep, to a depth of 46'. Good springs have been tapped at a depth of 38' from ground level as a result of which the well gives a continuous discharge of 4,800 gallons per hour at 30' from ground level.

In the same village another 6" ground boring was put to a depth of 52'. Good springs were tapped at 40' from ground level and it gives a discharge of 4,800 gallons per hour at 29' from ground level.

Siruvanaddu village:

In a 6" boring put down in a well 24' deep, to a depth of 65' good springs have been tapped between 55'—65' from ground level as a result of which the water level rose by 14' in the well. The well gives a discharge of 10,800 gallons per hour at 21' from ground level.

Tenneri village:

In a 6" boring put down in a well 24' deep, to a depth of 42' good springs have been tapped at 38' from ground level. The well gives a discharge of 7,200 gallons per hour at 22½' from ground level. The approximate cost of boring is Rs. 120.

Virduhachalam taluk:

In a 6" boring put down in Tholur village to a depth of 416'—0" from ground level good springs have been tapped between 406'-6"—416' from ground level as a result of which the water level rose up to 31'—3" above ground level. The water overflows at a rate of 18,000 gallons per hour. The approximate cost of boring is Rs. 4,500 and an extent of 39 acres will be benefited.

ANDHRA POLYTECHNIC KAKINADA

Statement of the Number of Admissions

Diploma Course

Name of the Course.	*No. of admissions.*
Overseers Course.	1 (one only).

The admissions for 1949-50 is over.

The Hon'ble Minister for Industries, Sri Perumal Swami Reddy, and the Direc-

tor of Industries and Commerce, visited the Institution on 3-9-1949.

Arthur Hope Polytechnic, Coimbatore

For the academic year 1949-50 the Polytechnic was reopened on 2nd July, 1949 and on the reopening date the strength of the senior students was 44. Admission to the junior classes was done as usual and the number of students admitted in each class is as follows:

Number of students admitted to—		
Auto-engineering course	..	50
Auto-servicing course	..	20
Radio-servicing course	..	7
Total	..	77

The strength of the Polytechnic as it stands today is 121. Attempt is being made to admit some more candidates for the Radio Section.

Hand operated ground nut decorticator designed by Mr. S. V. Balasundaram, demonstrator in this polytechnic, is being tested for village development. As instructed by the Director of Industries and Commerce, Arhur Hope Polytechnic has taken part in the Silver Jubilee Exhibition conducted by the Municipal High School, Coimbatore. Many of the Automobile and Radio parts sections were exhibited and hand operated decorticator has also been exhibited. The attendance was great as it was instructional. The students took great pains to explain the working of various parts to the people.

This year, the automobile workshop has been reorganised and repairs are being undertaken.

LIGNITE DEPOSITS IN S. ARCOT

Geological Survey completes Inspection

An inspection of South Arcot lignite deposits has been completed, says a report just issued by the Geological Survey of India.

The Survey has also struck manganese ore bodies in seven trial pits in the Paoni area in the Central Provinces.

The report adds:

Besides continuing the work of routine systematic mapping of various areas in the country, the Survey during this period continued magnetic prospecting for oil in Saurashtra and preliminary investigation in the Jwalamukhi area in East Punjab.

Detailed prospecting for Gypsum in Nawanagar and in Bharli in Rashthan was continued. Prospecting for ceramic clays in Hoshangabad, Chindwara, and Jubbulpore districts of the Central Provinces was completed and detailed examination for these clays was continued in the Santhal Parganas and Bhagalpur districts of Bihar. Investigation of glass sands in the Bundi district in Rajasthan was also in progress.

The Geological Survey of India have completed investigation of marble stone deposits in Sirmur State and limestone in this State as well as in certain other places. Investigation of limestone in Kotah State near the Kosi Dam site, in Nepal, continues. The re-survey of the south-eastern part of the Jharia coal-field was also completed.

Water Supply Problem

Geological work on the Damodar Valley project and Bhakra, Kosi, Hirakud, Pipri, Rampadasagar and Koyna Dams remained in progress; so also geophysical prospecting for ground water-supply at Dhond in Bombay Province and certain areas in Berar and Bikaneer. Investigation of the water-supply problem was also carried out in Amreli, Kandla, Rajpura, Chattarpur, Faridabad, Bhunveshwar, Nasirabad Cantonment, certain areas on Anantapur district of Madras, the Betul, Hoshangabad and Khardwa districts of the Central Provinces and in Gaya district in Bihar.

The Geological Survey of India prepared 34 separate reports on various investigations during this period, and its Information Bureau, attended to nearly 800 inquiries received from within the country and abroad.

Sericultural Section

Vivipary In Mulberry (Morus)

By Sri V. GOVINDAN, M.A., Assistant Sericultural Expert (Mul-Res) & Sri K. N. VENKATESAN, B.Sc. Pathology Assistant, Kollegal

Vivipary is a common phenomenon in the mangroves and jack fruits. It has also been reported to occur in mangoes, some grasses, carica papaya and prunus malus.

For the first time, occurrence of viviparous germination was noticed on 15-10-47 in fruits of Kashmir variety of mulberry in the nursery, Central Silk Farm Garden, Kollegal. Germination of seeds was noticed even while the fruits were not fully ripe and while attached to the tree. Fruits were allowed to remain in the tree sometime and observations noted. Only a loop was seen to develop in the seed in question and no further growth was noticed. Such specimens were collected and preserved.

On teasing, one such germinating seed showed the following features:—

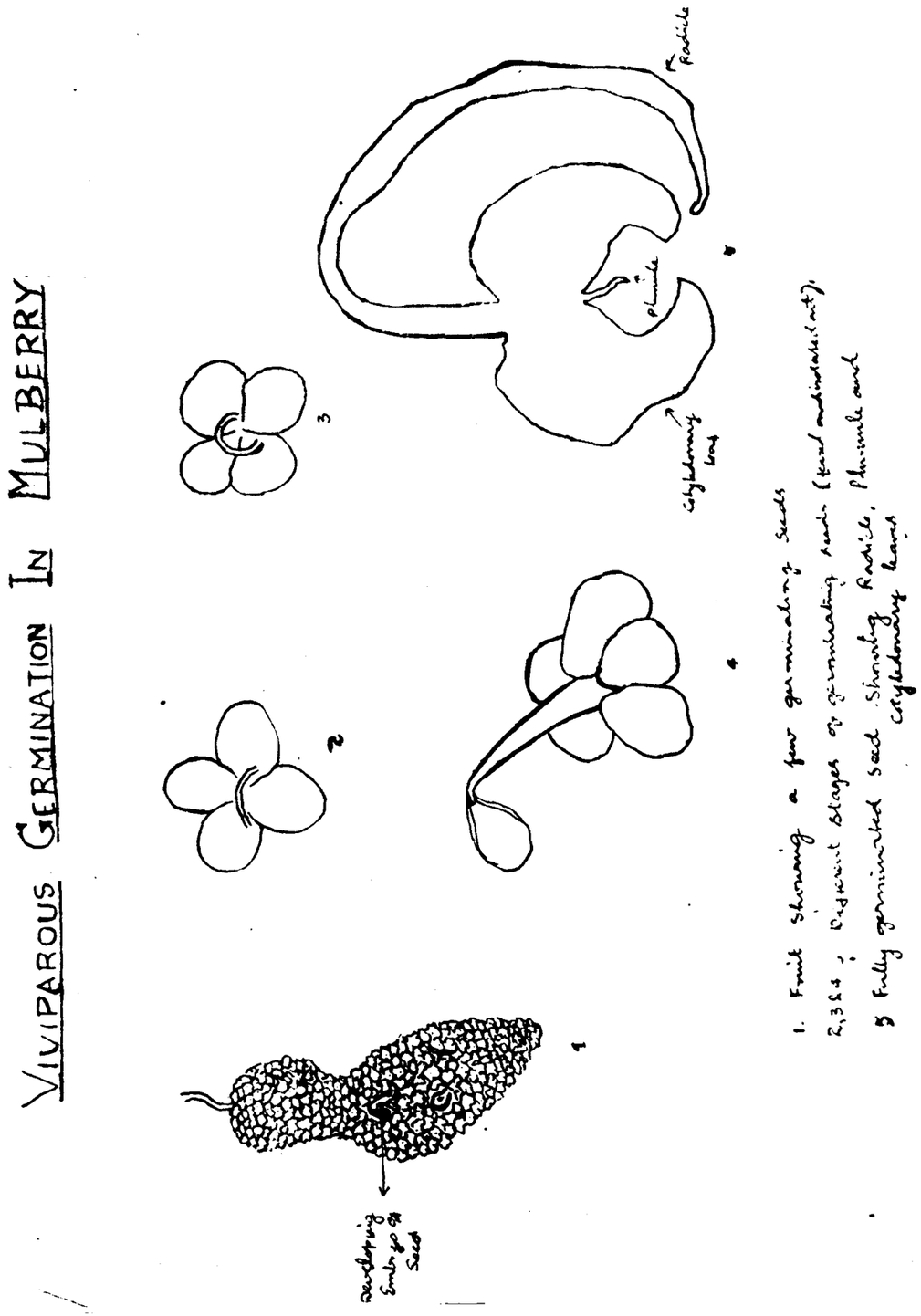
Two cotyledonary leaves and a small plumular region were seen. The details noted are indicated in the sketches appended.

As regards the seasonal conditions during October 1947, a quantity of 13·27″ of rainfall was recorded. The average temperature and humidity in shade were 75°F and 80 per cent respectively. As this phenomenon was not noticed in the other varieties of mulberry in the same nursery, this could not be explained as being due to the seasonal conditions. This is only a freak of nature,

COTTAGE INDUSTRIES

"Cottage and small-scale industries have a very important role in the national economy, offering as they do scope for individual, village or Co-operative enterprise, and means for the rehabilitation of displaced persons. These industries are particularly suited for the better utilisation of local resources and for the achievement of local self-sufficiency in respect of certain types of essential consumer goods like food, cloth and agricultural implements. The healthy expansion of cottage and small-scale industries depends upon a number of factors like the provision of raw-materials, cheap power, technical advice, organised marketing of their produce, and where necessary, safeguards against intensive competition by large-scale manufacture, as well as on the education of the worker in the use of the best available technique."

From THE GOVERNMENT OF INDIA'S RESOLUTION ON INDUSTRIAL POLICY.



1. Fruit showing a few germinating Seeds
2,3&4 Different stages of germinating seeds (Seed enclosed, Plumule and Radicle)
5 Fully germinated seed showing Radicle Cotyledonary bags

ROOT GRAFTING IN MULBERRY

It was observed during the past two years that the propagation of the Kashmir variety mulberry in the Central Silk Farm, Kollegal, from cuttings was not quite a success inasmuch as the rate of growth was very slow. As one of the chief advantages in grafts is that the reproduction is more rapid, root grafting with Kashmir variety was taken up in the Central Silk Farm, Kollegal, in the month of October 1947.

The usual method of root grafting is to raise seedlings in nursery beds to be used as stock and grafting is done after the seedlings complete two years' growth. As an experimenal measure, the root grafting was done in the farm as follows:—

When the bushes of mulberry are pruned in the natural course, the root-grafting is done. The scions were selected from the Kashmir variety of saplings in the nursery. Special care was taken to see that the branches chosen were not larger in diameter than the common lead-pencil and they were mature with small pith and free from insect-pests and disease. Scions are cut into bits of 6 inches in length. Then the scions are cut four strokes: (1) a slanting cut somewhat curved inward and about an inch long, (2) a slight cut along one edge of the cut surface, (3) the same cut along the other edge, (4) a little bark is sliced from the back side of the tip of the scion.

In order to carry out this grafting, three persons are needed. The first person digs the soil away from the stock until the top of the root is exposed. A slanting cut at the top of the stock is made by the other person the third person separates the bark of the stock from the inner woody part of the root by squeezing that region with fingers and inserts the scion with its cut surface outside towards the bark of the stock and the back or uncut surface towards the wood of the stock. The graft is covered with fine earth up to one or two inches of the top of the scion. No special binding is required. Details are shown in the sketches attached.

A portion of Plot 8 of the mulberry garden attached to the Central Silk Farm, Kollegal, was set apart for this trial. Cultivation, weeding and watering in this portion were done regularly and observations regarding the sprouting of the buds were noted every three days. Signs of sprouting of the buds were seen 10 days after grafting. The details of the success are indicated below:—

No. of plants grafted	.. 220
No. of grafts that were successful	.. 150
Percentage of success	.. 70%

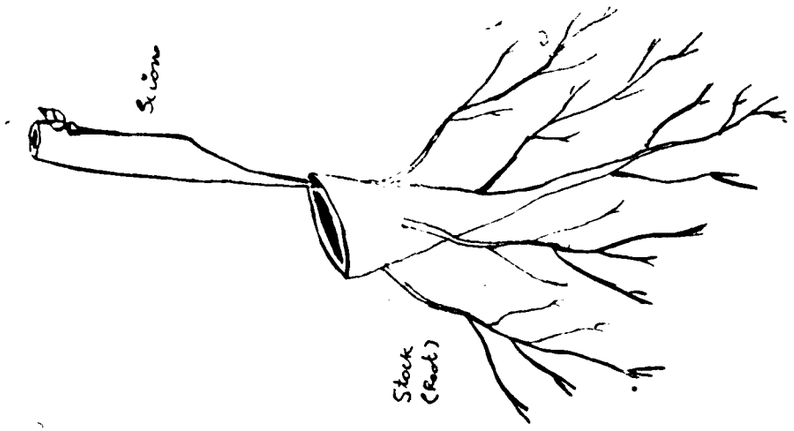
Observations

It is seen that the rate of growth is more rapid than the bushes in which no grafting was done. The leaves in the grafted plants were thick, juicy and larger in size, roughly about 5 times. A comparative idea could be had from the sketches attached. It has not been possible to conduct correlated rearings in order to find out the nutrition in these leaves as sufficient number of grafts have not yet been raised.

INCREASE IN PRODUCTION & EQUITABLE DISTRIBUTION

I do not believe that any sudden upset or complete break with the past, would stimulate production of industrial and agricultural commodities to such an extent as would justify such upset. I and my Government believe not only in the Doctrine of Continuity but also in a dynamic policy which will promote a rapid rise in the standard of living of the people by employing the latent resources of the country and offering opportunities to all classes of people—Capitalists, businessmen, administrators, technologists, skilled and unskilled workers—for employment in the service of the community—the prime consideration for such integrated effort being the benefits for the many and not profits to the few.

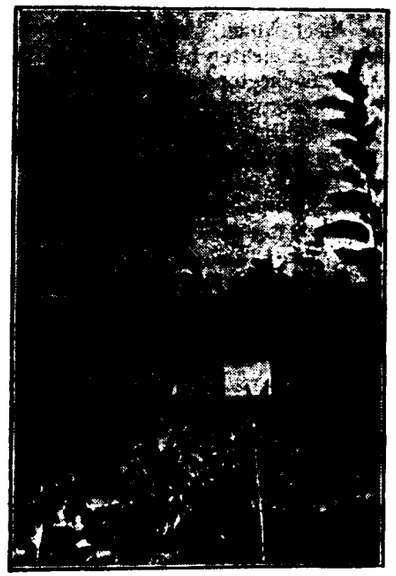
PANDIT JAWAHARLAL NEHRU



ROOT GRAFTING

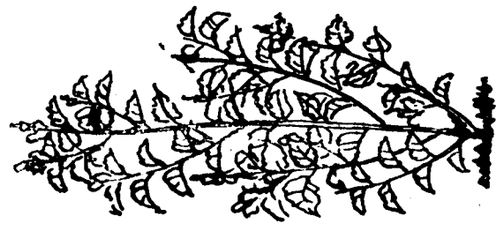
SCION

GRAFTED AND ORDINARY BUSHES

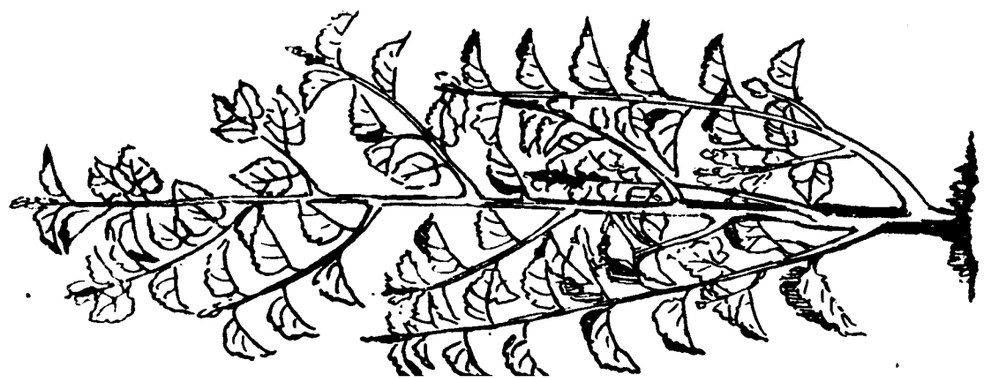


A. **Tall Bushes with broad and big leaves are Grafts.**

B. **Low-lying bushes with narrow and small leaves are ordinary bushes.**



ORDINARY BUSH



GRAFTED BUSH

DEVICES FOR OPTIMUM CONDITIONS DURING INCUBATION

BY

Sri. K. Tirumurthy, B. Sc.

It is necessary to ensure the safety of layings during incubation for proper hatching and satisfactory progress in rearing. The method employed in the Farm before 1946 consisted in keeping the layings in an incubator. But this ill-served the purpose when a large quantity of layings had to be kept in the Station before despatch to various places. A room measuring 6′ x 5′ x 10′ was selected for conversion into an incubation room. Certain alterations were made so that the conditions inside the room could be controlled easily. The height of the roof was brought down to 7′ by providing a corrugated zinc sheet which was later painted with whitelead. A heater bulb (200 watts) and an 'Almirah heater' (60 watts) were hung up in one corner of the room. The bulb and the heater, when continuously worked day and night kept the temperature between 73°F to 75°F when outside temperature went so low as 58°F. The humidity of the room is kept at 74%. Under these conditions the incubation period was not only shortened from 20 to 14 days but also uniform hatching was noticed. The duration of hatching was reduced to a day and the hatching percentage ranged from 85% to 95%. These devices have come in handy to bring about optimum conditions during incubation.

THE PARADOX OF A RICH COUNTRY INHERITED BY A POOR PEOPLE

Government believe in a mixed economy where State enterprise and private enterprise would flourish side by side and emulate each other. This system is now on its trial, and if it fails, the inevitable result would be the establishment of a socialistic State .... Under a system of mixed economy, progress of U. K. in post-war reconstruction has been faster than in U. S. S. R., and this has evoked the admiration of the world no less than her achievements in War .... Competent observers maintain that capital formation in relation to national income is much faster in U. K. than in Soviet Russia. This would be an object lesson to us in India. If we can also devise means for rapidly attaining full employment of our people by investing 20% of our national income in productive enterprises and in attaining self-sufficiency in Food Production, can develop their technical skill and provide them in an ever-increasing measure with modern tools of production, the paradox of a rich country inherited by a poor people will vanish in a few decades.

Dr. S. C. GHOSH

Director-General of Industries & Supplies

A NOTE ON THE EXPERIMENTS ON ARTIFICIAL TREATMENT OF CHINESE FARMERS

By Sri K. TIRUMURTHY, B.Sc.,

Farm Superintendent, Coonoor.

Chinese Farmers No. 29 is a Chinese Bivoltine race. This race was got from Channapatna Farm of the Mysore Government in 1945. It has been retaining its voltine character though it is XVIII generations old. So it had to be treated' in every generation in order to continue the rearings. The layings have been observed to hatch rather imperfectly though the quality is beyond doubt good. To find out whether there is any peculiarity in the race itself, an experiment was undertaken. In this connection it may be pointed out that whereas each of Chinese Farmers and Chahkwei were treated with 15% Hydro-Chloric acid, 24 hours after isolation at 115°F, the time of immersion in other races which were treated simultaneously behaved better. Chinese Farmers alone showed imperfect hatching. During November, two layings of 5 minutes at a temperature of 117°F and the rest were treated at a temperature of 115°F. The layings were kept in identical conditions of temperature and humidity and the percentage of hatching noted. In the experiment (details of which are given below), it was found that the greater the time before treatment the less is the percentage of hatching. In those layings treated late, greater temperature of acid ensures early and better hatching. By these, one could see that earlier treatment (i.e., 24 hours after isolation) ensures best hatching. But in these cases, it was found that the number of eggs was always less. The moths take a longer period than 24 hours for completing laying of eggs.

This experiment was repeated in December 1947 and the same results have been got confirming the previous observations. Full details of experiments are given in a tabular column below:—

Lot No.	Race.	Date of laying.	No. of D.F.Ls. kept.	Date of treatment.	Time elapsed before treatment.	Tint of eggs.	Temp. of bath.	Time of immersion	Date of hatching.	Ave. No. of eggs per laying.	Hatching %age.
Experiment No. 1.											
					Hours.			Minutes.			
143	Chinese Farmers	23-11-47	2	24-11-47 6 P.M.	24	Light.	115°F	5	11-12-47	360	85
,,	,,	,,	2	25-11-47 6 A.M.	36	,,	117°F	5	,,	421	80
141	Chahkuei	,, 23-11-47	2	24-11-47 6 P.M.	36	,,	115°F	5	12-12-47	410	72
,,	,,	,,	2	25-11-47 6 A.M.	24	,,	115°F	5	11-12-47	392	89
,,			2		36	,,	117°F	5	,,	446	85
,,			2		36	,,	115°F	5	12-12-47	457	86
Experiment No. 2.											
155	Chinese Farmers	7-12-47	2	8-12-47 6 P.M.	24	Light.	115°F	5	24-12-47	401	96
,,	,,	,,	2	9-12-47 6 A.M.	36	,,	117°F	5	,,	492	86
154	Chukwei	,,	2	8-12-47 6 P.M.	36	,,	117°F	5	25-12-47	405	71
,,	,,	,,	2	9-12-47 6 A.M.	24	,,	115°F	5	24-12-47	397	90
,,			2		36	,,	117°F	5	25-12-47	461	84
,,			2		36	,,	117°F	5	,,	425	87

(*Note*:—The time of isolation in all cases was 6 P.M.
Temperature of Grainage room in all cases was 72° F.
Humidity varied from 74 to 75 percent.
Temperature of incubation room where the layings after treatment were kept was 73°.)

A NOTE ON THE VARIATIONS OF HEALTH AND DEVELOPMENT AMONG A FEW EXOTIC RACES

By

Sri K. Tirumurthy, B.Sc., Farm Supdt., Hill Rearing Station, Coonoor.

It is a fact that new races should be got and reared to improve old races or to replace them. This gives rise in its turn to the question of preservation of such new races with vigour and purity. Though the latter work is easy by careful selection, health and development of a race cannot remain at a constant. They respond to climatic variations and quality of leaves. There are factors to which control is only to a certain extent possible. In the following the results of two New Chinese Races is followed for six generations to show the variable factors.

New Yellow (Chinese Univoltine). The disease-free layings for the first rearing were those hibernated for 90 days and released in April. The rearing results obtained in the successive generations were as follows :—

Particulars.	I Gen. (April-May 1946)	II Gen. (June-July)	III Gen. (September October)	IV Gen. (Dec.-Jan. 1947)	V Gen. (February Mar. 1947)	VI Gen. (April-May 1947)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. No. of D. F. Ls. reared ...	3	3	8	11	9	5
2. 5th Age (days & hours) ...	6-12	9-0	9-0	9-0	7-12	8-0
3. Total rearing period ...	28-21	37-0	35-3	35-15	34-3	31-9
4. Yield in No. ...	572	145	1,591	1,339	1,922	240
5. Yield in Weight (lbs & oz.) ...	2-3½	0-7	7-1½	4-6	7-11	0-11½
6. Yield per 100 D.F.Ls. (lbs. oz.) ...	74½	14-9	88-10	40	89-7	14-6
7. No. of cocoons per lb. ...	256	331	224	306	250	334
8. Weight of 10 mature worms in gram ...	38·5	31·0	33·0	34·0	43·0	36.0
9. Percentage of silk ...	24	21	20	18	19	18
10. Average Temperature & Humidity during rearing ...	61°-71° 76-78%	69° 76%	70° 73%	71° 80%	74° 76%	78° 76%

It could be seen that all the factors varied with season and with generation. But the variations are not without average means. As a comparison the results of a Chinese Bivoltine could be followed up. The source of layings for Old Yellow has been those hibernated from November 1945 to December 1945, consigned for 90 days and released for rearing. The results of rearing of the races were as follows.

Particulars.	I Gen. (Apr.-May 1946)	II Gen. (June-July)	III Gen. (Sept. October)	IV Gen. (Dec.-Jan. 1947)	V Gen. (Feb.-Mar. 1947)	VI Gen. (April June 1947)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Number reared ...	3	3	5	5	10	4
2. 5th age (days and hours) ...	8-0	8-0	10-0	8-0	8-0	8-12
3. Total rearing period ...	30-15	35-3	36-12	34-18	33-12	34-15
4. Weight of 10 mature worms in grams ...	36	30	33	33	42	36
5. Yield of cocoon Number ...	287	369	1,078	775	1,925	402
6. Yield of cocoons weight (lbs.) ...	1-2½	1-4	4-11¼	2-9½	7-13½	1-5¾
7. Yield per 100 D.F.Ls. in pounds...	38½	42⅔	94	52	78½	34
8. Number of coccons to a pound...	250	295	229	300	245	295
9. Percentage of silk content ...	19	19	20·75	17 5	17·5	17

The climatic conditions were the same as for New Yellow. In the sixth generation the seasonal conditions were none too conducive and all crops in rearing at that period had heavy incidence of Flacherie.

Article II

In this article, the development among two other New Chinese races is given. The results have not been uniform, changes being seen with variations in climatic conditions and quality of leaves. The health and development of Chahkuei and Chinese 6 are taken here for study. It may be noted from the rearing results that the weight of mature worms has no bearing on silk content. Worms with greater weight have often less of silk content.

SACRIFICES NEEDED

" . . . . . For our economic independence, we shall have to make different types of sacrifices and put in constructive work of a different sort. In that task, we shall require the help of the cultivator, who toils in the field, of the labourer who works in the factory, of the rich who have wealth and can create more, and of the middle classes who, I know, have had to bear a heavy burden."

SIRDAR PATEL.

Chahkuei:—Chahkuei is a Chinese Univoltine race. Layings of this race were hibernated and released in April 1946. Upto the end of 1947, nine generations were reared and the record is listed below :—

Particulars.	Gen. I	Gen. II	Gen. III	Gen. IV	Gen. V	Gen. VI	Gen. VII	Gen. VIII	Gen. IX
No. of D.F.Ls. reared ...	4	2	12	12	9	4	3	3	3
Duration of 5th age ...	10 days	11-0	9-0	10-0	7-6	7-3	9-0	10-21	6-6
Total rearing period ...	32 days	38-0	35-0	37-0	31-4	29-9	35-21	34-9	31-12
Weight of 10 mature worms...	36 Gms.	33-0	32-0	32-0	40-15	32-0	30-0	32-0	36-2
No. of cocoons per lb. ...	240	238	260	467	322	366	247	260	302
Yield per 100 D.F.Ls. ...	Lbs. 3-2	10	80	60	32	42	9	80	91
Percentage of silk ...	21%	18½%	20%	18%	15.6%	16.5%	17%	19%	17½%
Season ...	May June 46	July Aug.	Sep. Oct.	Dec. Jan. 47	Feb. March	April May	June July	Aug. Sep.	Oct. Nov.

Many factors vary with seasons and with generations. But the silk content averages 18% and it has remained thereabouts in later generations.

Results obtained for Chinese 6, a Bivoltine race have the same qualities. During the nine generations, it had seasons of good development and seasons of growth. The worms in their tenth generation were as robust as they were in their first generation.

The results in the nine generations of its rearing is given here :—

Particulars.	Gen. I	Gen. II	Gen. III	Gen. IV	Gen. V	Gen. VI	Gen. VII	Gen. VIII	Gen. IX
No. of D.F.Ls. reared ...	3	4	4	4	7	4	5	3	3
Duration of last stage ...	9 days	8-0	9-0	10-0	7-0	7-3	7-0	9-9	8 0
Total rearing period ...	29 days	42	36	36	31-12	31-9	32-9	32-9	33-9
Weight of 10 mature worms..	Gms. 35·6	32·0	35·0	32·0	35·0	38-0	32·0	34·0	32·0
Yield per 100 D.F.Ls. ...	Lbs. 55	18	41½	72	70	44½	32	56	60
No. of cocoons per lb. ...	224	283	221	375	298	332	485	330	270
Percentage of silk content ...	18%	19%	20%	16·5%	16·6%	16%	17·5%	17%	15·%
Season ...	April May 46	June July	Sep. Oct.	Dec. Jan. 47	Feb. Mar.	Apr. May	June July	Aug. Sep.	Oct. Nov.

The seasonal and climatic conditions were the same as for the Univoltine Chahkuei The Univoltine has behaved better than the bivoltine qualitatively and vice-versa for quantitative results. The New Chinese races in general have been improving with continuous rearing. Ere long the Old races would yield place to the New ones in all aspects.

Fisheries Section

MIGRATION OF FISHES

By P. I. CHACKO, M.A., F.Z.S.,

ASST. DIRECTOR OF FISHERIES (Fresh-Water Biology), MADRAS

FROM time immemorial whole tribes of people have been deserting their native soils for new lands. Various promptings have governed their movements. Some tribes have been driven out by oppression, others have been enticed by greed, still others have been actuated by promises of freedom. That birds journey southward in great flocks to escape the cold of winter and return northward in the spring to avoid the heat of summer is well known to everyone. But the precise causes why fish migrate are less evident. Science has made many new discoveries about the life history of aquatic animals. There yet remains much to be learnt about their migrations. But there is great need of this knowledge if we ever hope to enact laws for the better regulation of our fisheries. Even far-reaching international fishery policy, depends upon an accurate knowledge of this subject.

There are two categories among the fishes, with reference to their movements. One is that of the species which are caught all the year round, which, consequently, seem always to live in the places where they are caught. These are the 'sedentary' fishes. The term 'sedentary' species does not mean that they remain always in one place, for these fishes, in fact, do move. But they still keep within the bounds of their home waters, and never go beyond them. The other category is that of the travelling species, which are caught only at definite seasons, and not throughout the year. These make up for this disadvantage by their extreme abundance when they do appear, and they yield the best catch. These are the 'migratory' fishes which are of two kinds—the anadromous and the catadromous. The term anadromous is applied to fish like the salmon and the shad, which migrate from the sea into freshwater to spawn. The term catadromous is applied to fish like the eel, which leaves freshwater to spawn in the sea. Fish which leave the sea to spawn in estuaries only differ in slight degree from those which spawn just beyond brackish-water. So, it may be said, all degrees of anadromous migration from mid-ocean to the upper limits of streams may take place and corresponding catadromous migrations.

Many scientists have attempted to explain the causes for fish migration. Two causes, namely, the search for food and the search for suitable spawning grounds, are regarded as most important in determining the course of fish. Though there is some foundation for this view, it will not, in strictness, apply to most cases, for appropriate food is very widespread, and not limited to special localities. Omitting certain very exceptional instances, discoveries of science in recent years have shown that the spawning process might be appropriately performed in almost any area through which migrating fish may pass. But, far from being erratic and wholly uncertain, the migrations of fishes exhibit in general the most astonishing regularity, and so true they may be to their particular migratory course, and to the period of their appearing, that some profound cause is evidently at work; some cause more potent than the search for a favourite feeding ground, or for an accustomed spawning resort. It is said that migration is the consequence of a temporary harmony between the creatures concerned and the conditions of the environment in which they live. To the compulsion exercised by environment and by inorganic naure, there is another added, the internal compulsion of the reproductive function. In other cases, the nutritional factor compels the fish to migrate to places where, for the time being, prey is more abundant. Other vital activities may also play a part from within. But all these factors, whatever they may be, though they follow laws of their own, are unable to come into play except when they are in harmony with those of the exterior environment.

It is also said that the force which drives the anadromous fish into rivers from the sea is the consequence of a need for more vigorous respiration. All the anadromous

fishes, as they prepare for spawning and while the elaboration of their germs is proceeding within them, display a vastly increased respiratory activity which could never be satisfied in seawater. Unlike most other marine species, which are able to find all they want where they are, their needs are more intense, and since, they are particularly able to adapt themselves to freshwater conditions, they leave the seawater, which has not enough dissolved oxygen to suit them, and go to the estuaries. There they are first aided by the dechlorination of the water which assists their respiratory processes. As they go farther and farther up the running freshwater, whose content of dissolved oxygen increases gradually as they near the upper reaches, they are continually encouraged to push on, to go higher and higher still. But most of them, sturgeon, shad, lamprey, seldom go beyond the middle reaches of the river basins. The salmon, however, go farther still; the greater intensity of their respiration driving them ever onwards to the regions near the mountain tops. In the case of the salmon, most of the parents, after the act of spawning, perish. But nature is neither cruel nor wasteful. In her sight, the only thing of value is the series of successive generations; individuals are important only in so far as they assure this succession. Deaths and disappearances are of no account, it is the coming life, that of the offspring, which alone matters.

The best example of catadromous fish is the common eel, *Anguilla vulgaris*, of Europe, which makes its astounding migration of over 2,000 miles from the European shore to spawn in deep water, south of Bermuda, swimming against the North Atlantic drift and the Gulf Stream. The young are borne by the currents just mentioned on the return journey, during which they undergo their remarkable metamorphosis, starting as the Glass Fish (*Leptocephalus*), and reaching the coast as small, eel-like elvers which travel up the rivers. Many people fail to realise that these elvers should be protected. Though the leptocephalus has been recorded from various parts of the Indian Ocean, definite breeding grounds of the common Indian eel, *Anguilla bengalensis*, have not been discovered.

It is worthwhile to consider here the existence of barriers to free movements of fishes. In general, those streams and rivers which have conditions most favourable to fish life will be found to contain the greater number of species. Some of the conditions most favourable to the existence in any stream or river of a large number of species of fishes are—(1) connection with a large hydrographic basin, (2) a warm climate, (3) clear water, (4) a moderate current, (5) a bottom gravel (preferably) covered with a growth of weeds, and (6) little fluctuation during the year in the volume of the stream or in the character of the water. There can be no doubt that the general tendency is for each species to extend its range more and more widely until all localities suitable for its growth are included. The effect of waterfalls and cascades as a barrier to the diffusion of most species is self-evident; but the importance of such obstacles is less, in course of time, than might be expected. In one way or other, very many species have passed these barriers. But dams or artificial waterfalls now check the free movements of many species, especially those of migratory habits; while conversely, numerous other species have extended their range through the agency of canals.

The problem of dams and migratory fishes has recently received greater attention in Europe and America, where provisions such as fish ladders, fish passes and fish lifts have been made to the several dams constructed for hydro-electric projects. Since the sixties of the last century efforts have been made in India to provide fish passes in the construction of dams so as not to interfere with the migration of the fishes ascending to their breeding grounds and afterwards on their return journey to the feeding grounds or vice versa. The available evidence goes to show that fish passes were and are still being constructed by the engineers who may be wholly ignorant of the habits of the fish that are meant to be saved from possible extermination. For instance, to save the extensive and valuable Hilsa Fisheries, the Government of Madras, at the suggestion of Dr. Francis Day, constructed fish passes, across anicuts, as early as 1869, but these proved ineffective, and after another

exhaustive enquiry by Sir F. A. Nicholson in 1909, fish passes as a protective measure for Hilsa were finally abandoned, and for the preservation of the species the proposal for the construction of a Hilsa hatchery at the Lower Anicut on the Coleroon River was adopted instead. Several fish ladders have since been constructed in the Punjab; and they have also proved to be defective. It is therfore necessary that surveys of the fisheries resources be made by qualified experts in co-ordination with engineering surveys, so that fish ladders suited to the habits and requirements of local fishes are provided. In the meanwhile, steps in the promulgamation of measures of protective legislation preventing capture and slaughter of breeders and young ones congregating below barriers and other areas are being adopted. The spectacle of a crowd of fish congregated at one place is often a temptation too potent and too insistent for the unlawfully minded to resist. But the creation of reserved areas is not in itself sufficient. We must also increase production and so make up for the natural deficit. The processes of reproduction by artificial fertilisation offer us the means; and many migrating species particularly the salmon and shad lend themselves to such processes. Several salmon and shad hatcheries are run successfully in Europe and America. With the exception of the hatchery at Bobberlanka in the Godavari delta, artificial propagation of the shad is not conducted in India.

The Indian shad, *Hilsa ilisha,* is the most important anadromous fish in our country. It is a choice fish of remarkable quality, both because of its delicacy and deliciousness. It has an extensive distribution in the Indian Ocean. It begins its upward journey usually with the commencement of the freshets and continues moving up in shoals till about the close of the rains. It ascends the Cauvery from June to September, the Godavari from July to the middle of October, and the Kistna from October till December. It spends its life, prior to attaining maturity, in the sea, where it swims about in small groups not far from the inshore waters. This life of growth in the sea is spent in intensive feeding, with the result that their flesh is filled with fatty substances which form a reserve to be drawn upon later when the time comes to spawn. At the time of puberty, the Hilsa, which have hitherto been dispersed about the sea, now gather and form large shoals. The males are more precocious, and they arrive first, the females coming after them. They either do not feed or partly abstain from feeding on their journey upstream.

It is said that there is a relation between the extent and the life-giving quality of the flood waters and the coming of the Hilsa. The greatest floods, going deeper and penetrating farther, thrust forward their zone of influence till it affects the Hilsa living at the various parts of the sea. The first sign is an increased activity in the respiration. The fish, gorged, replete, on the point of pubescence, feels the need of more intense oxydisation in order that assimilation may be complete, and it turns in the direction from which such oxydisations come. The Hilsa fishermen of the estuaries, who work when the fish leaves the sea for the river, know that their best catches come sometimes after each flood water. And the fishermen have employed all their ingenuity in constructing appliances with which to catch it. The breeders after migrating beyond the tidal area, prefers the middle reaches of the rivers to shed their reproductive elements. The period of incubation is short, and the fry grow to about 10 to 12 inches in their first year of life, spent mostly in brackish water. From that time onwards, they live at sea, returning to the rivers to spawn. Thus the Hilsa has two successive phases in its life, namely, a nutritive life of growth in the sea and a genetic life of reproduction in the river.

We thus see that the fisheries of migratory fishes play a great part in national economy. Their protection and development, therefore, should be one of the main items in the scheme of fishery administration in our country. Unregulated capture is simply catching fish for food without any concern for future supply. Fish have been endowed with certain means of increase and protection. The number of eggs may be enormous, and sufficient to counterbalance natural waste. The operations of man, however, are in excess of natural waste; consequently such a destructive agency requires to be kept in some check.

DEEP SEA FISHING IN MADRAS

By V. D. SPURGEON, B.A., ASST. DIRECTOR OF FISHERIES (P. & C.)

Introductory.—The fact that the sea covers three-fourths of the earth's surface is well known. But the sea is so vast that none can easily comprehend its size in square miles or its volume in cubic miles. To a layman, the sea simply appears as a barren waste fit for nothing. When you examine a drop of sea water under the microscope, you witness the most fascinating creatures on earth: animacules of all shapes, sizes and patterns darting across the lens of the microscope full of life. These minute organisms are called 'Plankton'. Those are really pastures of the sea. On these, fish and other marine fauna feed and thrive.

Wealth from the sea.—From the sea we get fish, coral, shell-fish, sponge, tortoise-shell, fur and leather and chemicals like, salts, iodine and other products like pearl, agar-agar, amber, fish-oil, fertilisers, and a host of other articles of commerce.

Fish as food.—Of these, fish is common and is easily caught along the coasts where favourable conditions exist. Fishes are marvellously abundant in North Temperate seas. About the different kinds among them, it is estimated that there are 19,000 different species known to the Ichthyologists today.

Next to Agriculture, Fisheries are the important source of human food. Unlike Agriculture, Fisheries offer unlimited possibilities for exploitation. The yield from the sea does not depend upon tilling, manuring and such other efforts involved in Agriculture. It does not also depend on favourable weather conditions. For comparatively less capital outlay, less labour and less of enterprise we can harvest nature's food crops from the sea.

Worlds' important Fisheries.—World's important Fisheries lie wholly within the North Temperate zone and for the most part crowded between the fortieth and sixtieth parallels of north latitude. Fisheries in these regions are prosecuted with vigour and their annual catches are astounding.

The important factor for fish to multiply is food. In United States, Great Britain, France, Spain, Canada, Norway and Japan there are large rivers and lakes and the extensive coastal indentations which are suitable to promote 'Plankton' life, which forms the food of small fishes, the small fishes in turn form the food of larger species. The world's total catch of fish before the last war is estimated to have amounted to approximately 18 *million tons* per year. Except Germany and France many European countries have approached and exceeded, that of prewar production:—

	Prewar Metric tons	Postwar Metric tons
Norway ...	935	835
United Kingdom.	1,070	920
Denmark ..	107	190
France ..	400	250
Germany ..	650	260
Iceland ...	290	370

Indian Fisheries.—Broadly speaking fisheries of tropics are unimportant. So the Indian seas are not so rich as Temperate seas are. However there are fairly good fishing ground along the long and varied 3,220 miles coast of India.

In the postwar period the words "Grow more food" and "Industrialisation of India" have come to stay in "New India". We hear more often in papers about fisheries development measures being taken up in this or that part of our vast Union. The Government of Bombay have devised a number of plans for the improvement of the fishing industry. Mr. John L. Kask, Chief Biologist, Fisheries Division, United Nations Food and Agricultural Organisa-

tion, who was in Bombay on 7-4-1949, has said that he was on a three-month tour in South East Asia to study the development of Fisheries in the region, and was glad to see India make considerable headway in tapping the seas and the fresh waters to help the solution of her food problem.

Now in many fishing centres, fishing is mainly with primitive crafts and inefficient gears. The fishermen do not venture to go beyond the inshore belt of ten miles from the coast. With such out-of-date equipment and limited exploitation it is estimated that 700,000 tons of fish were landed on the Indian coasts every year.

The available supplies of fish mentioned above are quite inadequate to meet the demands of the rapidly increasing population. Even with normal food position the fish supply was far below the needs of the nation. Now when the food shortage is acute, the fish should be so much as to substantially supplement the grains. The pre-war fish catches should be increased at least 10 to 11 times.

There is ample scope for development of fishing industry for the Fisheries resources of our subcontinent are not only varied but fairly good. When scientific methods are applied to the fishing industry and trawlers are introduced the present-day output can easily be increased threefold, and then it would really be a great contribution to the food, to the country and to the national wealth.

Deep Sea Fishing in Madras.—Deep sea fishing operations were initiated in the province in July 1948 in order to increase the catches of sharks and thus ensure an abundant supply of shark livers during war for increasing the liver oil supply to the fighting forces. After war when there is no demand for fish oil the units are fishing for increasing food alone. There were 37 deep sea fishing centres with eight motor fishing vessels and about a dozen centres function today. Each unit consists of a motor boat, 3 canoes, about 8 fishermen and nets. There are 115 fish curing yards and 63 fishermen co-operative societies. The motor boats tow fishing boats with a few fishermen and operate long lines, hand lines and sometimes nets in the off shore region and dispose off the day's catches either fresh or sometimes salted. As most of the time is wasted in covering the distance of 20 miles or so each way at 6—10 knots an hour the time actually spent at the job is limited to 4 to 6 hours. This is totally inadequate. There should be modern equipment for fish preservation at sea by refrigeration plants or arrangements on board the fishing vessels so that catches can be brought ashore once in two days or more and the catches do not putrefy and become huge waste.

The motor boats are not good for large scale fishing. The cost of propulsion and the cost of maintaining the technical staff and crew would not certainly be commensurate with the income. If enterprises, whether financed by Government or private companies were to lose in the actual working, they cannot pull on for long. Again the cost of maintaining such costly fishing units can be usefully diverted to grow food on land or in purchasing grains from overseas.

United States fishing fleet consists of 69 steam vessels, 5,298 motor vessels, 195 sailing vessels, 31,055 motor boats, 33,134 other boats and 2,059 accessory boats, and in all 71,810 crafts. The catches in 1940 were 16 lakhs of tons of sardines, menhaden, mackerel and salmon. Their total worth was 7·2 crores of dollars. Britain has nearly 3,000 steam fishing vessels and more than 3,000 motor vessels.

When compared with the attainments of other countries Madras is nowhere. With a long coast line on the East and the West and Madras occupying the apex of the great triangular penninsula, with a large force of fishing population scattered all along the coast fishing industry at present is far behind times. Without improving fishing industry it is almost impossible to raise the economic state of the presidency. Fishery will go hand in hand with Navigation. Britain could not have become a maritime state without mercantile marine and without a fishing fleet.

Hope, therefore, lies in maintaining steam trawlers and powerful motor vessels and not small motor boats. For the building and maintenance of the fishing fleet we need a number of building yards, repairing yards, foundries, dockyards, wharfs, workshops, etc.

Trawlers are special steam fishing boats with trawl nets. The nets used in steam trawlers are of two types: (1) *The Otter trawl* and (2) *Beam trawl.*

(1) *The Otter trawl.*—This very effective gear is in use on the banks of Atlantic coast. The Otter trawl measures about 115 feet long, 22 feet broad, and 12 feet deep equipped with 450 horse power engines and of a gross tonnage of 200 to 300 tons. The Otter trawl is a large flattened conical bag, the mouth of which is held open by two large boards one on each side. To the boards are attached the towing warps which are so adjusted that when the trawler moves the net is towed along the bottom and the resistance of the water causes the boards to pull away from each other. The nets are about 150 feet long and of strong Manila twine of 3 inches mesh and 1½ inches mesh in the central portion. The net is towed along at the rate of 2 to 3 miles per hour usually for about 1½ hours.

(2) *Beam trawl.*—In this the bag net is attached to a beam with iron frames. The beam holds the mouth of the net distended to collect as much fish as possible as the trawler moves along dragging the net which sweeps the ocean bed.

Besides these two trawl types of nets largely in use in large scale fishing in Western countries, there are scores of other kinds of gears, of which haul, drag or beach seines, purse seines, hand-lines, pound-nets, and gill-nets, are of some importance.

There are very good fishing grounds off Coromandel Coast and Malabar district The fishing bank off Cape Comorin has not been touched yet This bank (Wadge Bank) is rather extensive with several types of commercially important fishes Even during heights of monsoon, fishing is possible. With A-1 tarred road from the point of landing fish in the Cape upto Nagercoil, Trivandrum, Tinnevelly, etc., marketing fish, caught in pink of condition, is quite possible. Better, a strong deep sea fishing fleet is permanently stationed at this spot and the catches transported by insulated vans to avoid putrefaction due to hot climate experienced almost throughout the year in this part of the presidency.

The number of fishing units today appears far too low to meet the demand for fish. The units should venture far into sea and fish on important banks. A survey of the deep sea is to be taken up with a view to locate more and more of good fishing grounds. When more grounds are found out with trawlers in charge of expert master fishermen, fishing can be conducted economically. The deep sea fishing should be a commercial proposition, with clear profit after meeting all the charges for maintaining the vessels and paying the staff. When this is achieved, without doubt the fish supply is sure to be steady to the two-thirds of the fish eating population now made to go without fish.

The Hon'ble The Minister for Fisheries, visits Tuticorin

Hon'ble Sri J. L. P. Roche-Victoria, M.L.C., Minister for Food and Fisheries to the Government of Madras, was pleased to visit the Pearl and Chank Fisheries Office at Tuticorin on 10-6-1949 with Mrs. Roche. They were received by Mr. V. D. Spurgeon, Assistant Director of Fisheries, and taken round.

Again on 12th and 13th July, the Hon'ble Minister visited the office for attending a conference of Fisheries officials and non-officials. The Deputy Director of Fisheries

(North), Mr. D. D. Peter Devadas, and the local Assistant Director, Mr. V. D. Spurgeon and the following non-officials were present:—

1. Mr. C. Machado.
2. Dr. Augustine.
3. Reverend Father Susainathar.
4. Sri Laxmana Chettiar.
5. Sri Venkatakrishnan.
6. Sri Doraisamy.
7. Sri Arokiasamy.
8. Mr. J. S. Miranda.
9. Rao Bahadur Fernandez.
10. S. M. Roche.
11. Mr. Viswam Fernando.
12. Mr. Shroff.

The question of how best to reorganise the Fisheries Technological Institute, Tuticorin, was considered in detail.

The Hon'ble Minister stressed the need for fishing more and more to supplement the food grains.

On the two days of the conference, 12th and 13th July, two huge sharks measuring 14 feet and 13 feet were bagged by the Tuticorin Deep Sea Fishing power boats. The Assistant Director Mr. D. Spurgeon led the Hon'ble Minister and the non-officials to the Storage to view the heavy catches.

The Hon'ble Minister was pleased to inspect the Deep Sea fishing operations at Pamban on his way back from Kurusadai Island on 20-7-1949. The Hon'ble Minister and his party were taken on board M.F.Vs. "Adirampatnam" and "Madras". The motor schooner "Lady Nicholson" with her heavy catches of sharks, perches and seer was shown by the Assistant Director Mr. V. D. Spurgeon to the Hon'ble Minister. The Deputy Director explained in general the Deep Sea operations.

The following day the Hon'ble Minister was taken to Vandioor Teppakulam. The Deputy Director and the Assistant Director of Fisheries, explained how best religious institutional inland waters could be utilised to grow inland water fish with a view to add more food to the public. Later he visited the Thirumakulam tank in Tallakulam, Madura, where giant gourami (Java fish) and catla (quick-growing carp) were netted and shown. He also visited the gold-fish nursery in the Mission Hospital premises. Mr. V. D. Spurgeon explained the Inland Fisheries Development programme.

Photo shows one of the sharks landed by Tuticorin Office.

Record Fishing in Tuticorin

The departmental activities were re-organised on and from 1-7-1949. At Tuticorin M.F.V. "Tuticorin" fishes off Tuticorin. The following are the sharks caught during July 1949:—

Serial No.	Date.	Length of shark.	Weight of shark.
1.	9-7-1949	10 feet	310 lbs.
2.	11-7-1949	2 sharks of 9 feet	670 lbs.
4.	12-7-1949	14 feet	660 lbs.
5.	15-7-1949	14½ feet	1000 lbs.
	(They measured 6 feet round the abdomen, there were 50 young ones in the womb.)		
6.	19-7-1949	9 feet	220 lbs.
7.	20-7-1949	13 feet	600 lbs.

Shark liver yields medicinal oil rich in Vitamin A. The flesh is good eating. The leather is useful to make suit cases and hand bags. The fins are exported for soap and glue manufacture. The teeth are used for ornamental purposes.

Industries Exhibition—Tuticorin

Annually the feast of "Our Lady of Snows" falls in August. During that time an Industrial Exhibition is organised and run for the benefit of thousands of visitors The Fisheries Department took part in the Exhibition as usual.

This year our stall was visited by the Hon'ble Minister for Food and Fisheries on 5-8-1949.

TUTICORIN CALLING

I. The Fisheries Section of the Industries Department was reorganised on Regional instead of Functional basis from 1-7-1949. Consequently the Assistant Director of Fisheries had been allotted, besides his usual items of work (such as Pearl, Chank, Fisheries Technological Institute, Yards, Oil Centres, Yard Distribution, Formation of Co-operative Societies, Exhibitions, etc.), two new branches of work, viz., the Deep Sea Fishing at Tuticorin and Pamban Island and Development of Inland Fisheries in Tinnevelly, Ramnad, and Madura districts.

II. Proposals are already well under way to take over several uncared for tanks for growing more fish on scientific lines. The public who want to culture fish in their garden-pools or big tanks may contact the Assistant Director of Fisheries, Tuticorin, for fish-seeds and free advice.

(*a*) *Gourami.*—Gourami fish is the best fresh-water fish for the table. Its seeds can be supplied from Chettinad.

(*b*) *Etroplus.*—Etroplus fish is the best fish for stocking waters infested with murrels, snakes, frogs and other fish enemies, as it easily escapes them. The seeds of Etroplus can be supplied from Kadamba and Kurvirthurai centres.

(*c*) *Chanos.*—It is sea-fish but it grows quickly in fresh water. It will not breed in fresh water. However, thousands of seeds can be stocked in waters near its collection source at Pamban. Persons who own tanks in Ramnad and Madura Districts may ask for chanos from the Pamban centre in charge of the Assistant Director of Fisheries, Tuticorin.

III. Kadamba lake and Upper Dam Reservoir in Tinnevelly District and Thekkadi Reservoir and Kodaikanal lake in Madura District are very large sheets of water. Except for Thekkadi, work in other lakes has already commenced. Fisheries in them are protected from total annihilation, and exotic fish species are transplanted in them. Catla—a quick-growing carp will soon be transplanted in Hope lake and Thekkadi Reservoir for establishing this exotic species in Thambirabarni river and Periyar. In Kodaikanal Hill Station (the queen of South Indian Summer resorts) cold climate European fishes—Mirror carp and Trout—will be introduced in November this year. Private parties who wish to get any of these fishes for stocking their waters in these regions may contact the Assistant Director of Fisheries, Tuticorin.

IV. There is an attractive and instructive fisheries museum in Tuticorin Fisheries Office. The Fisheries Technological Institute, the Chank Godown, diving operations in open sea off Tuticorin, plying revolving chain hooks for monster sharks in deep sea, fishing for pearl oysters etc., are worth seeing. The visitors to south and passengers to Ceylon and overseas *via* Tuticorin are always welcome to see them.

For further particulars please contact the Assistant Director of Fisheries, Tuticorin, by post or in person.

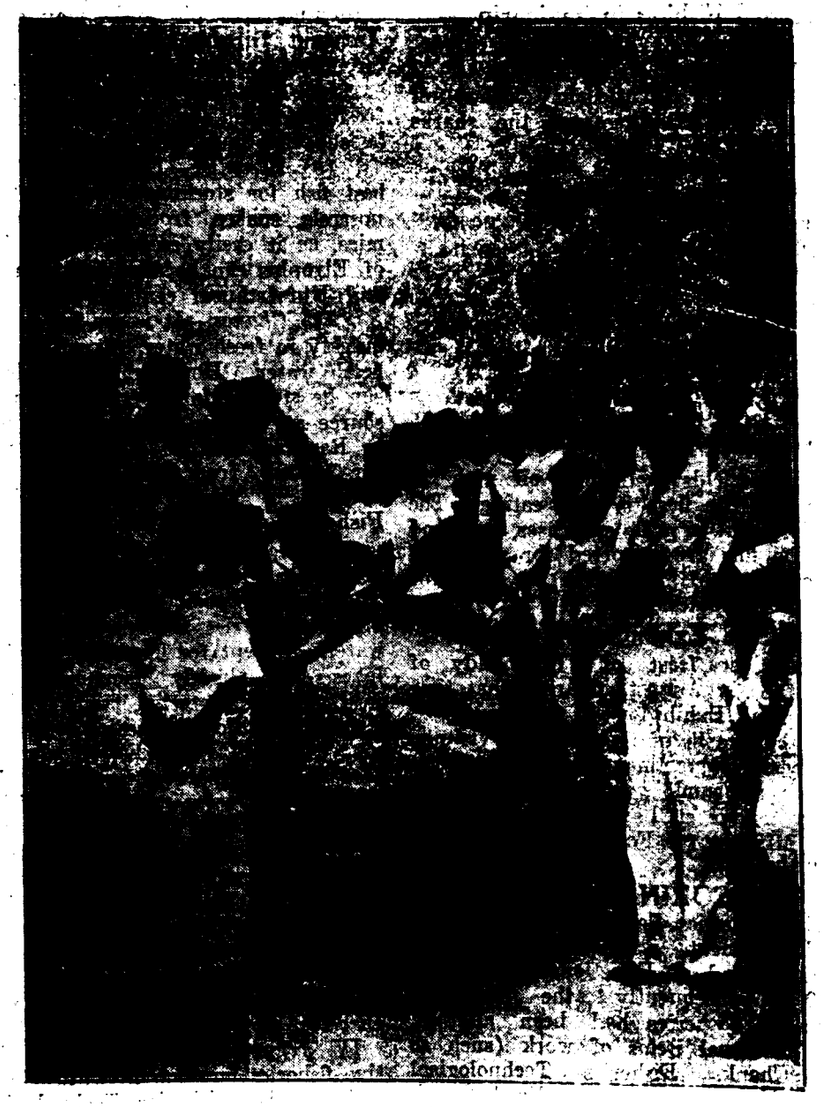


Photo Showing a Shark weighing 1000 lbs.

Reopening of Aquarium on the Marina

The Government are considering the re-opening of the Madras Aquarium at its old place on the Marina. It was closed during war.

It is expected that a new building, with better accommodation will be provided, before the aquarium is restored to the Marina. The specimens are now at the Museum of the Fisheries Marketing and Information Office, Kilpauk.

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