FACT

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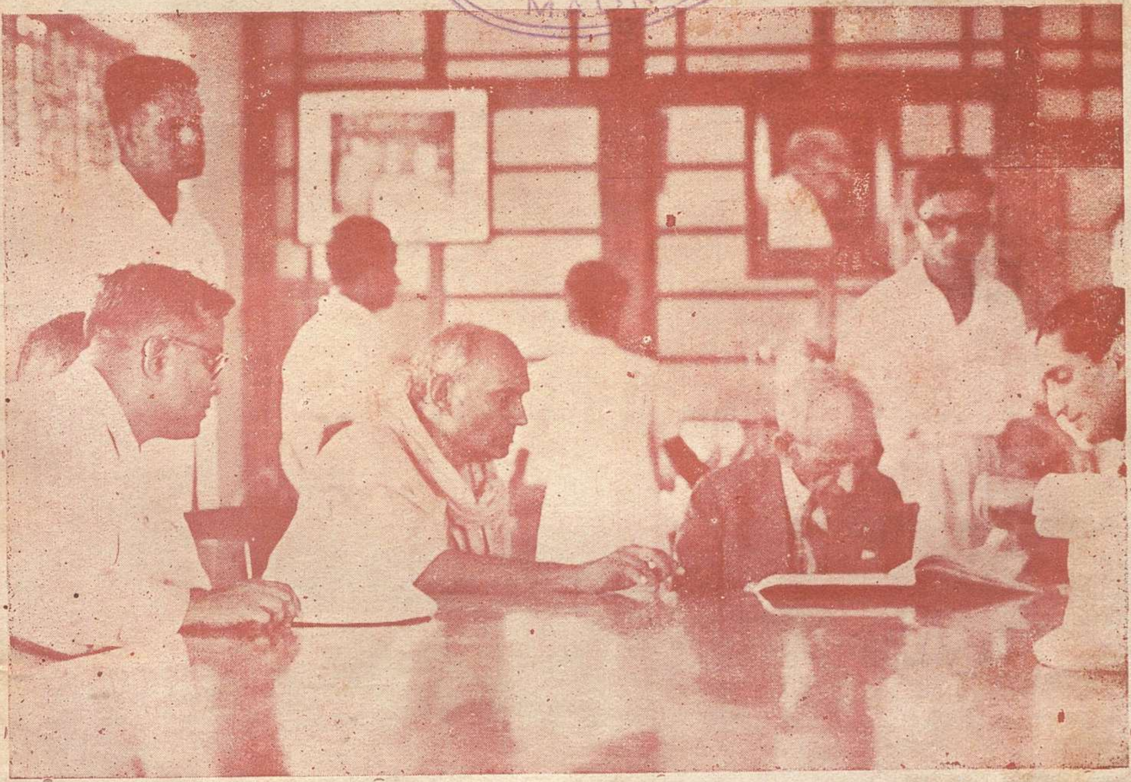

Sir M. Visveswarayya Visits F. A. C. T.
In the picture he is seen examining the album containing the photographs of the various plants of the Factory. On his right is Sri. S. Neelakanta Iyer, Cochin Congress Leader.

F. A. C. T. Stall in the All India Industrial and Engineering Exhibition held at New-Delhi.

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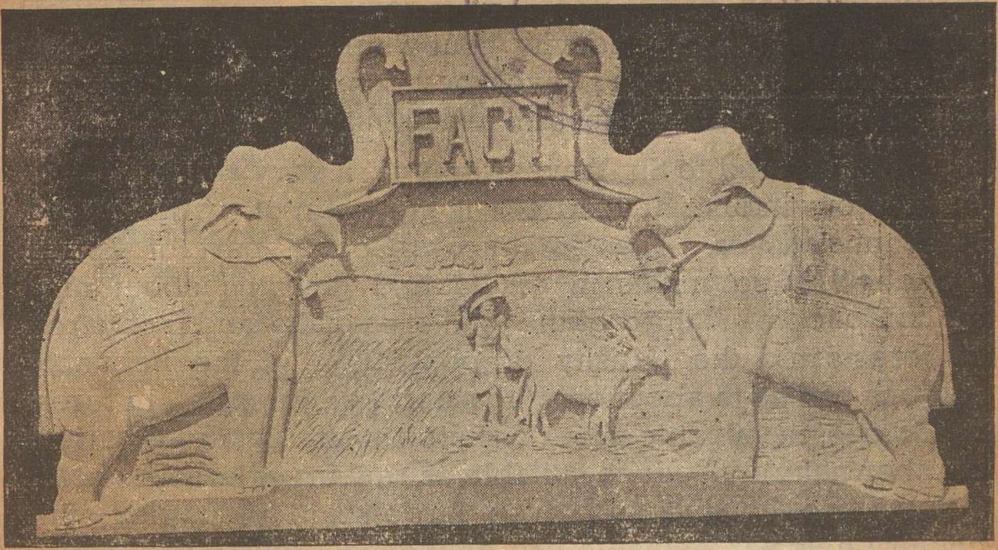
Books and Pamphlets on scientific, industrial and allied themes are accepted for review in this Journal.

Editor.

In this Issue ....

PAGE



VOL. 5 | APRIL 1951 | NO. 10

EDITORIAL.

KERALA'S INDUSTRIAL POSSIBILITIES.

"INDUSTRIES increase production and income; they are necessary for the manufacture of defence machinery; they are indispensable for civilised existence. No nation at the present time becomes prosperous or militarily powerful without the aid of industries". Thus spoke Sir M. Visveswarayya presiding over the Eleventh Annual Conference of the All India Manufacturers' Association held at Ernakulam on the 26th of the last month.

The Veteran Industrialist and Administrator, analysed the special facilities of Kerala for development on Industrial lines and pointed out that if these are properly utilised and exploited, our possibilities for advancement are ample indeed.

Kerala, taken as a whole abounds in Industrial raw materials; her resources of power and labour are plentiful and waiting to be successfully tapped. The percentage of educated persons is higher here than elsewhere in India and this aspect, Sir M. Visveswarayya rightly points out, ought to operate as a remarkable asset industrially; for in a country where occupations are properly organised, more education means increased productivity. But with all these advantages Kerala remains an under developed country instead of taking a leading role in the Industrial awakening of India.

According to Sir Visveswarayya a very serious drawback to our industrial progress is the want of reliable and relevant statistics. The Travancore-Cochin part of Kerala alone is 9155 sq. miles in extent and contains about nine million people. A third of the total area of the land is covered by forests and the density of population in the habitable regions comes to about one thousand per sq. mile. In forest resources, in valuable mineral deposits, and in a vast variety of other natural produce suitable as raw material sources for a number of cottage and even large-scale industries, this country holds an enviable pre-eminence But, when considered on an all India basis, the achievements of the state in the province of industrialisation remains backward and poorly. Though there are a few large scale and quite a number of minor industries functioning in different parts of Kerala we have no available means of ascertaining their aggregate size or collective value to the country at large. This handicap is extremely lamentable.

Apart from our inability to obtain accurate statistical data concerning our industrial commitments, Sir M. Visveswarayya, goes on to observe, how it is plain that our progress has not covered even a fraction of our immense possibilities. The reason according to this doyen of Indian Industrialisation, is that the necessary organisational ability and spirit of enterprise and mutal co-operation are lacking.

Our responsibilities have increased a hundred fold since the attainment of independence and the need for an all-out and sustained effort by every unit of the Indian Union, is now urgent and imperative as never before. Conferences like the one held at Ernakulam last month, and the pronouncements of persons of great eminence and vast experience like Sir M. Visveswarayya go a long way to inspire and enthuse the general public in that they afford the much needed directive to canalise and strengthen on activities along the right lines.

FERTILISER PRODUCTION REQUIREMENTS

By

S. NALLAPERUMAL, B. A., B. Sc. (Engg). M. I. S. E., A. M. I. E., A. A. I. E. F., A. M. I. I. Chem. E.

THE fertiliser requirements of the country have been variously estimated to be nearly 2 million tons of nitrogen and 1 million tons of P_2O_5 and for the next five years the yearly requirements based on practical attainability has been reckoned by the Planning Commission as 5 lakhs of tons of nitrogenous fertilisers and 2 lakhs of tons of phosphatic fertilisers. Out of this the present installed capacity for production is as follows:

	Nitrogen. (Tons)	Ammonium-Sulphate (Tons)
Mysore	1,200	6,000
Travancore	10,000	50,000
Sindhri	70,000	3,50,000
Coke oven gas	4,000	20,000

There are 14 superphosphate plants in India with a total installed capacity of 1·5 lakhs of tons (25,000 tons of P_2O_5). It will thus be seen that only about 3% of the estimated requirements could be met by the present installations. The scope is, therefore, immense for the further expansion of fertiliser production in India.

At present only ammonium sulphate and superphosphate are manufactured in India. The raw material requirements of these are as follows:

1) Travancore Plant:

Producer gas from firewood and conversion of ammonia to sulphate by sulphuric acid and gypsum processes.

Firewood: 60,000 tons per annum.
Gypsum: 45,000 „ „
Sulphuric acid: 18,000 tons (or 7,000 tons of sulphur per annum)

2) Sindhri Plant:

Coke: 1,75,000 tons,
Coal: 2,50,000 „
Gypsum: 5,00,000 „ (All available in India)

3) Mysore Plant:

Sulphuric acid: 7,500 tons (or 2,500 tons of sulphur)

Electricity:

4) Superphosphate Plants:

(Total production: 1 lakh tons).
Rock phosphate: 75,000 tons.
Sulphuric acid: 35,000 tons (or 12,000 tons of sulphur)

From the above it will be seen that for the present fertiliser plants in India about 50,000 tons of sulphur and 75,000 tons of rock phosphate are required per annum. The total imports of sulphur in 1950 was 30,000 tons and for the next two or three years it is estimated to be about 50,000 tons per annum. Against this we are not even certain of 50% of the sulphur being made available from U. S. A. or Italy. There are 30 chamber plants and 9 contact plants working in India all on sulphur, with a total capacity of 1.4 lakhs of

* A paper read in the Symposium held at Poona on 10th Mar. 1951 under the auspices of the National Chemical Laboratories of India, the Hon. Sri Prakasha presiding.

tons, and it has become highly necessary to conserve sulphur.

We have to see how far sulphur requirements could be minimised in the present plants and also see that in any new fertiliser plants sulphur is obviated.

In the Travancore plant already we are examining the proposal of modifying the present plant so that it entirely operates on gypsum instead of 50% on sulphuric acid and 50% on gypsum.

While examining the question of sulphuric acid it is interesting to consider the use of alternatives for sulphur.

Pyrites:

We have to import pyrites from countries like Spain, Cyprus, Norway and Finland. Pyrites contain about 45% sulphur and hence the tonnage to be transported and handled is large consuming much money by way of freight.

Elaborate purification plant and special roasters are necessary. From quotations received it is seen that the plant costs approximately the same amount as the acid plant using brimstone. One objection to the pyrites process is the disposal of the sintered ore. Unless a market is found for the sintered ore this process will be uneconomical.

Gypsum:

One potential source of sulphur is gypsum and we have a fair amount of gypsum in India. Government estimate 15 million tons of gypsum at Trichy and 15 million tons at Bikaner. Besides this the Pakistan Salt Range in the Punjab is estimated to have 70 million tons. The possibility of establishing two or atleast one gypsum-sulphuric acid plant in India in gypsum areas is worth investigating.

The capital cost of a 75 ton sulphuric acid plant using brimstone is Rupees 20 lakhs and that of using gypsum is 50 lakhs. The cost of production of acid based on 40 per ton of sulphur is Rs. 150 to Rs. 200 and that of gypsum acid between Rs. 200 and 250, based on Rs. 40/- per ton of gypsum. This will be producing also the same tonnage of cement as acid and we have taken the rebate at about Rs. 60/- in compiling the cost of production of acid.

There are gypsum sulphuric acid plants in operation in Germany and France and England. Though acid from gypsum and pyrites will be costlier than acid from brimstone when elemental sulphur is non-available we may have to go in for the alternative.

Rock phosphate has to be imported from foreign countries. It has been estimated that the known deposits will last for over 1000 years. The nearest deposits to India are in Egypt wherein Kossier and Safaga rock is mined and at Kossier an installation is being erected for upgrading the rock. India's requirements of rock phosphate are now being met by Morocco, Safaga and Kossier. Recently a shipment has been got from Makatea Islands (very high grade). Ocean, Nauru and Christmas Islands possess rock phosphate deposits of high grade sufficient to last for many years but at present sale of this rock is not available to India. U. S. A. has enough rock deposits at Florida to meet her domestic consumption as well as for export and rock phosphate is freely available from U. S. A. for import into India.

The procedure to be adopted in the establishment of new fertiliser factories both nitrogenous and phosphatic may briefly be recounted.

Nitrogenous:

For nitrogen fixation by far the most widely used process is the synthetic ammonia method by the modified Haber-Bosch process and the same can be adopted in India.

It is said that a 100 ton ammonia per day unit is the most economical one and the price is indicated as 10 million dollars. Ammonia should be manufactured in centrally situated suitable locations from where it can be transported to small fertiliser works:

For ammonia synthesis nitrogen is obtained mainly by:

1) Liquifaction of air.
2) Burning hydrogen in air.
3) Controlled combustion of producer gas.

And hydrogen mostly by:

1) Semi water gas process.
2) Liquifaction of coke oven gas.
3) Producer gas and steam iron process.
4) Electrolytic process.

In the Travancore plant hydrogen and nitrogen are obtained from producer gas got by burning firewood. Any low grade fuel can be used for the generation of producer gas. There are standardized plants available from Messrs. Bamag, Lurgi and Power Gas.

The lignite deposits of North Arcot, Rajasthan and Hyderabad are potential raw materials.

Hydrogen and nitrogen obtained by the above methods are combined to form ammonia. Ammonia as such is obtained as a bye-product in the distillation of coal for coke manufacture. From this source India makes 6000 tons of ammonia per year. One important point to be considered here is that if electricity is available in sufficient quantities and at cheap rates electrolytic process of hydrogen manufacture will be a very attractive proposition. The power requirements for the manufacture of ammonia by this process is about 2000 KWH per ton of fixed nitrogen.

In the electrolytic process high purity hydrogen is obtained. This process is in wide use in Italy and Scandinavian countries and recently one such factory is set up in Spain. Of the two ammonia plants in operation in India the one at Mysore is working on the electrolytic basis. The average requirements is 16,000 KWH per ton of nitrogen fixed.

"With the development of the hydro-electric sources of the country as at present programmed, it may well be that we may choose the electro-chemical method of ammonia manufacture as a development load on our power systems. Apart from providing products of vital national importance, it will serve to conserve our resources of coking coal. Another outstanding advantage of this process is that as air, water and electricity are the only chief factors that are required in the manufacture, the plant for the manufacture of ammonia can be located close to hydrol generating stations.

Notwithstanding the high cost involved in hydrogen manufacture by the electrolytic process it cannot be ruled out, particularly in locations where there will be a surplus of power. In the East Punjab, for example, where over 3,00,000 KW will be generated when the Bakhara project goes into full operation, this process can profitably be adopted.*

The capital cost of a 100 ton ammonia plant from coke will be about 10 million dollars and a 100 ton electrolytic plant will cost 30% more (rectifier and accessories inclusive). The electrolytic hydrogen plant will be economical if electricity is available in sufficient quantity within Rs. 80/- per K. W. Year.

In considering the development of fertiliser production we may follow the trends that we see in advanced countries like U. S. A. Given below is a statement showing the U. S. Fertiliser Production in 1948—49.

U. S. Fertiliser Nitrogen Supply 1948—49.

	Tons.
1. Ammonium nitrate	1,68,000
2. Ammonium sulphate	2,42,000
3. Other nitrogen compounds: Ammonium phosphate, Lime ammonium nitrate, Urea mixture, Calcium cynamide, Calcium nitrate etc.	1,34,000
4. Ammoniating liquors: Ammonium nitrate-ammonia, urea-ammonia, ammonia for ammoniation and anhydrous & acqua ammonia for fertiliser	2,70,000
Total	8,14,000

Of late successful large-scale field tests carried out by agriculturists and chemical engineers show the suitability of direct application of ammonia liquor and liquid ammonia. Liquid ammonia is used for direct injection into the soil in U. S. A. and Germany. The advantages will be outstanding when the method of application is brought to perfection that the ordinary Indian farmer can use it without recourse to costly handling equipments, and this is undoubtedly the cheapest and concentrated of all synthetic nitrogenous fertilisers. In our factory investigation work has been started on this proposal.

One important fact has to be kept in mind about development programmes. The flexibility of the plant to cope up with new demands and changes in fertiliser production techniques and practices is essential.

When once ammonia is manufactured it can be converted to any of the salts like nitrate, sulphate, chloride or phosphate.

A case for Ammonium nitrate:

Ammonium nitrate is being used in increasingly large quantities in U. S. A., Germany and other European countries. In the manufacture

* Sri V. Seshasayee in his paper on "Utilisation of Electricity in Fertiliser Industry"

of ammonium nitrate and urea no sulphur compounds are necessary.

Comparison of prices per unit of nitrogen:

Ammonium sulphate: Rs. 12½
Ammonium nitrate: Rs. 6½

Ammonium nitrate either as such or formulated to other fertiliser goods is used extensively in U. S. A. Though U. S. A. has considerable deposits of sulphur, nitrate has been manufactured in large quantities. Some of the drawbacks of ammonium nitrate are:

1. Moisture absorption.
2. Caking tendency.
3. Explosibility.

Moisture absorption may be delayed by applying a water repellant coating of paraffin, petroleum or similar material and can be prevented by bagging in water-proof bags. Caking may be prevented by treating with 5% kiesel guhr.

Explosibility: With ordinary handling precautions this can be overcome. From 1942 to 1947 2 million tons have been transported over land and sea and handled without any explosion or serious mishap.

Ammonium nitrate is a concentrated fertiliser containing 35% nitrogen. It is usually diluted with chalk and marketted as 'Cal-ammonium-nitrate', containing about 15% nitrogen. Excepting for the provision of the required quantity of calcium carbonate its manufacture does not need any raw material other than air, water, electricity and process steam. Ammonia is oxidised into NO_2 and absorbed in water, the resulting nitric acid is mixed with ammonia to form ammonium nitrate. This ammonium nitrate is diluted with calcium carbonate. Both nitric acid and ammonium nitrate are very useful not only as fertiliser but also for the manufacture of explosives and other war and peace time materials. The manufacture of nitric acid and ammonium nitrate have been perfected to such a degree that there is hardly any chance of explosion hazards.

Urea:

Urea is manufactured by reacting liquid CO_2 and liquid ammonia in an autoclave at 350°F and 100 atmospheres pressure. A liquor is formed containing urea, ammonia and ammonium carbonate. Urea is crystallised out of this. When once ammonia and carbondioxide are available and high pressure technique is mastered urea synthesis can be taken up. Since no carbondioxide will be available where electrolytic hydrogen is used for ammonia synthesis this plant (urea) should be tied up to the ammonia plant using producer or water-gas for hydrogen. Urea is considered a satisfactory fertiliser and is widely used in compounds. It does not react with potash salts or super or ammonium sulphate. Du Ponts manufacture urea-ammonia liquors which are used for ammoniation of super as well as in mixed manure.

Ammonium Chloride:

For certain crops field experiments in Rothamsted have shown ammonium chloride to be as effective as sulphate. Ammonium chloride can well go into mixed manures where now Kcl is used. The manufacture of ammonium chloride will be a profitable outlet to bye-product chlorine also.

Ammonium Phosphate:

Ammonium phosphate is an excellent fertiliser which has a very good demand in India. Because it is a concentrated fertiliser carrying 2 plant nutrients the manufacture of ammonium phosphate will be very feasible especially because the internal transportation costs are very high. There are two methods of manufacturing this, either by the sulphuric acid process or after making phosphoric acid by the electric furnace process. The immediate possibility is only making ammonium phosphate by the sulphuric acid process. We had a proposal to make ammonium phosphate by the sulphuric acid process and use the resultant gypsum in the ammonium sulphate plant. Now that sulphur has become very scarce the proposal is not taken up. Since the Travancore plant manufacture sulphuric acid, ammonia and superphosphate we think this ammonium phosphate proposal will tie well with our plant. In any projected scheme of ammonium phosphate manufacture phosphoric acid should be prepared by the electric furnace process in India.

Phosphate Fertiliser:

Four basic methods are used in decomposing phosphate rock to obtain products suitable for fertiliser purposes:

1) Sulphuric acid process.
2) Thermal reduction process.
3) Calcium metaphosphate.
4) Calcination or defluorination process.

All these processes have been worked out and successful plants are operating in U.S.A. In India only the first method is worked. Even there only straight superphosphate is prepared. The production of superphosphate in India in 1950 was 50,000 tons and the acid consumed for this is 20,000 tons. Some possibilities are:

(1) Calcium metaphosphate.
(2) Fused Tri-calcium phosphate.
(3) Phosphoric acid from elemental phosphorus for eventual conversion into triple super and di-ammonium and mono-ammonium phosphate.
(4) Treatment of phosphoric acid with hydrochloric acid for the production of dicalcium phosphate.

Here it will be interesting to note that this will be a profitable outlet for bye-product chlorine from caustic soda plants. The one important drawback is the disposal of calcium chloride. Belgium and France produce about 30,000 to 40,000 tons of dicalcium phosphate per annum.

(5) Treatment of rock phosphate with nitric acid.
(6) Using rock phosphate as such.

The ground rock phosphate which goes under the trade name 'Hyperphosphate' is phosphate rock ground to 300 mesh fineness. This has given very excellent results in acidic soils. In Travancore in the Kari soils which are acidic, this has shown very good results. We have 1,20,000 acres of Kari lands in Travancore and for this some 6000 tons of rock phosphate will be necessary. Similarly in the west coast soils which are acidic quite a good quantity of ground phosphate can be used direct.

(7) Ammoniated superphosphate:

When once ammonia is manufactured it is converted into some salts which act as the carrier for this ammonia. If we ammoniate all the superphosphate produced in the country i.e. at present about a lakh of tons, 3000 tons of ammonia can be transported as fertiliser without cost. Otherwise for the conversion of this 3000 tons of ammonia into ammonium sulphate by the acid process 800 tons of sulphur will be necessary. This is an advantage over and above the saving in freight. Ammoniating the super has other advantages like prevention of bag rot, better physical characteristics and supply of double plant nutrients. The T. V. A. has developed the dry process of making phosphate fertiliser to a high degree and we can adopt the same in India.

Phopshoric acid:

For a 20 ton P_2O_5 plant the capital cost based on today's ruling prices and as an average of prices from U. S. A., U. K. and Germany is about Rs. 20 lakhs by the sulphuric acid process. By the electric furnace process the capital cost will be 40 lakhs and by the blast furnace process it will be 60 lakhs.

Approximately the raw material requirements for the processes will be as follows:

For 1 ton of P_2O_5 as crude phosphoric acid by the wet process, 2.6 tons of sulphuric acid are required. This is equivalent to 0.9 ton of sulphur.

For the 1 electric furnace process in the form of elemental phosphorus the energy required is 6000 KWH, coal $\frac{3}{4}$ ton and carbon electrodes 20 lbs.

For the blast furnace process and by the thermal reduction method the coke required for fuel and reducing purposes will be about $2\frac{1}{2}$ tons.

With the above data if we work out the cost per ton of P_2O_5 we will find the cost almost the same for the three processes. Of the latter two, electric furnace process will be the more attractive.

In all these cases we have to assume that phosphate rock is available. We have to always depend on imported rock phosphate. Because this is a large item involving transport, the plant to be situated as near a port as possible. The next question is availability of electric energy. If 5000 KW power is available at a place like Alwaye certainly a plant for the manufacture of 20 tons of P_2O_5 per day is possible and with the high price of sulphur now, the phosphoric acid and eventually triple super and ammonium phosphate from that plant will be economical. It is not possible to give all the details here. But this is a proposition worth looking into.

Workers learn value of higher Productivity.

By

C. H. HARTWELL

Editor of British T. U. C. Publications

PRODUCTION is a word that is going out of fashion in Britain now, despite the demand of the export markets and the rearmament programme and the claims for a higher standard of living. The talk instead is of productivity, a word nearly worn thin by the publicists before industry was wide awake to the facts when all the workers and machines are busy there is no hope of higher output except by getting more out of the machinery and man-power that is already at work–that is, by higher productivity. To many workers this sounded at first a call for more toil and sweat or for longer hours at the work-bench and, after a strenuous war effort, this was an unattractive proposition, except in short spurts to meet a sudden emergency. Fortunately, exhortation in general terms was soon ruled out as likely to get little response and a whole-hearted campaign began to ram home the advantages of productivity in terms of prices costs and earnings and ease of work.

The result? Exact measures of an increase in productivity are difficult to assess, but all authorities are agreed that there was a significant increase in productivity during 1950. For the first 6 months, as compared with the same period in 1949, this was estimated by some as six per cent or even as high as nine per cent. That is an average, of course; some industries have done better than others, and inside each industry, some factories have broken records while others have jogged along. In the campaign to bring the less enterprising into line with the up-and-doing, trade unionists have played a significant part. Both nationally and locally, trade union leaders set out to convince the sceptics that full employment could best be maintained and living standards safeguarded by higher productivity. They gave the honest facts about jobs and practical proposals for doing the jobs better. Thus, in a bright booklet that went to one in every two of Lancashire's cotton spinners a dozen men and women from the mills told their fello-workers that 193 mills-hands could produce as much yarn as 238 produce now, if all mills used their labour as skilfully as the most efficient. The displaced would not be idle, for other jobs–just as well paid–could easily be found for them in an industry that is crying out for more hands.

Practical Suggestions.

In the chemicals industry, the Government won the co-operation of the employers and the unions for the drafting and distribution of a pamphlet which concluded with six practical suggestions for chemical workers to help in making their industry prosperous. More pointedly, actual examples of cases where management and workers have together tackled the business of stepping up the output of their factories by improved methods of working are given month by month in Government advertisements which have been appearing for nearly two years in some 30 influential trade union jurnals. Much of this propaganda has been directed towards wiping out the remaining pockets of resistance to such devices as mechanical handling, incentive bonus schemes, re-deployment and time and motion study. Fear of the stop-watch as an instrument leading to sweated labour is diminishing as worker's representatives are called into discussion on ways to find less backbreaking ways of doing a job, by studying the movements made in one operation and eliminating all those which are wasteful of time and energy. Fear of dismissal has been broken down in demonstrations which showed that re-arrangement of work could ensure that skilled workers are employed all their time on skilled work, leaving all the fetching and carrying to be carried out by machinery or by workers lacking a craftsman's skill.

Research Associations:

Mindful, however, of the risks that in speeding the pace of progress their members might get crushed under the wheels, unions have been equipping themselves with up-to-date technical knowledge so that they may meet progressive managements on equal terms and at the same time be ready to prod the less progressive into policies that will bring not only increased earnings for workers but lower costs to be passed on as lower prices to consumers. Through joint production committees' background training courses on production, unions now know why productivity must be raised and thus can concentrate in spreading this knowledge. Industrial research associations are among the agencies engaged in this task. The latest to give practical evidence of its willingness to grapple with the immediate questions as well as the long-term problems is the research body maintained by the boot and shoe industry. After a year's investigations, its experts have produced a factual survey of the comparative labour productivity of 12 important factories. The facts are now in circulation throughout the industry, not only among employers, but among the workers, too, for the unions are directly represented as the governing body of the association. None of the firms surveyed was mentioned by name. Less reticent, however, are the firms whose productivity achievements are publicised in *Target*, a monthly bulletin sent by the Government to representatives of workers and management in firms with more than 50 employees.

Secret of Success:

What, in that broadsheet, is indicative of the spirit growing in Britain's industry is the asterisk set against the names of firms willing to share the secrets of their success with others. A spot-check has revealed that 14 firms in every 100 have picked up a worthwhile hint from *Target*. One homely example from a recent issue shows the sort of results industry is getting. By simplifying the product and the work that goes into it, by more machanisation, and by the aid of an elected workers' committee, an engineering firm has raised its output of gas cookers by 187 per cent, cut the selling price by one-third, and put up its workers' earnings by 15 to 20 per cent—all this in just over a year. It looks like an ample justification of the slogan current in Britain-"Productivity pays everybody".

DEVELOPMENT OF COTTAGE INDUSTRIES

The Committee on Industry and Trade, of the United Nations Economic Commission for Asia and the Far East which recently met in Lahore has considered the proposals made by Mr. V. R. Chitra, Cottage and Small-Scale Industries Expert of the Government of India, who was deputed by ECAFE to make a survey of cottage and small-scale industries in the countries of its region.

Mr. Chitra suggests that textile technologists and master weavers from the United Nations Technical Assistance Administration be deputed to assist the handloom weaving industry in introducing modern technique. He suggests a similar team of fibre experts to assist the fibre industry; the setting up of pilot plants for the production of hand-made paper, and for ceramics, dissemination of information on improved methods of making jaggery, and on smithy and carpentry.

The position of cottage and small-scale industries in most countries of the region is not satisfactory. Many have survived as handicrafts, meeting limited demands for artistic or special quality products; others cater for household requirements. Both types in varying degrees are characterised by inefficient organisation, archaic techniques, stereotyped designs and poor marketing methods.

To plan and provide assistance from Government or other sources for these industries, it is desirable that, as a first step, a uniform definition and classification be adopted by countries.

After giving such classifications, the report deals with the organisation of cottage industries. Inadequacies in organisation arise out of a lack of proper Governmental agencies to speak on behalf of the industries and consider their problems on an overall basis—a gap which has now been filled in many countries, lack of common technical service facilities, inadequacy of facilities for the training of workers in advanced techniques, lack of financial institutions specially suited to the needs of these industries, inadequacy of market intelligence organisations, and lack of research facilities. In many of these fields State initiative and assistance are called for.

The state should take a more active interest in promoting the formation of associations, on a zonal basis, of those engaged in cottage and small-scale industries.

For the proper development of these industries, a detailed survey of each industry on uniform lines is necessary. On the recommendation of the All-India Cottage Industries Board, India, and the Central Advisory Committee on Cottage Industries, Pakistan, these Governments have recently undertaken country-wide surveys. It is suggested that other Governments should carry out similar surveys at an early date to provide the basis for a programme of development.

Institutions imparting knowledge of and training in advanced techniques are industrial schools demonstration units or centres and training institutions. There are about 5,000 such institutions in india, the more important being the Central Weaving Institute, Benares, the Central Wood Working Institute, Barcillu, the Central Coir Institute, Beypore and the Leather Institute, Madras. The Central Research Centre, Ceylon, Saunder's Weaving Institute, Burma, the Textile Institute and the Batik Experiment Station, Bandung, are of special note.

These institutions, however, have not made much impact on production efficiency, as trainees in many cases do not return to their villages and, if they do are generally unable to set up improved equipment for lack of capital.

For the vast majority, who cannot take advantage of these institutions, extension services are needed to impart to them knowledge of improved techniques and give assistance in the provision of new tools and equipment.

The co-operative mcvement has brought significant changes in the techniques of financing and marketing.

Handloom Weaving

The textile industry, organised on small-scale or cottage basis, gives fulltime employment to approximately 25,00,000 workers in India, 3,00,000 in Pakistan, 2,00,000 in Burma, and large numbers in other countries.

From 20 to 30 per cent of the requirements for cotton textiles in each country are met by this industry.

Among the countries of the region India employs the largest number of workers in the small-scale and cottage textile industry. The number of handlooms in the country is estimated at 21,00,000. Powerlooms number 18,000. The total production of cloth by this industry is 1,000 million yards, valued at Rs. 1,000 million per annum, i. e. about 35 per cent of the textile mills output. It supplies about 26 per cent of the cloth consumed in the country and a substantial consumption demand outside. Some 25,00,000 workers are engaged in the industry as compared with 7,00,000 in the textile mills, supporting in all a total of about 10 million people.

Rs. 10 lakhs is placed annually at the disposal of the All-India Cottage Industries Board to meet half the cost of approved schemes of the State Government for the development of the handloom industry.

A Central Cottage Industries Emporium was established in 1948 to promote sales of handloom products. Show-rooms have recently been opened in the U.S.A. (Washington and New York), Australia, Indonesia and Thailand. Special exhibitions are being organised in the other countries.

A Central Research Institute for Cottage Industries, in which research in textile technology will be carried out, is nearing completion. India's immediate needs include multiple spinning machines—power as well as hand-operated and a large and regular supply of fine yarn.

The report also points out the need to develop marketing, and encourage the imports of the products of cottage industries.

The report next deals with various other industries of the region.

Fibre Industries

It is pointed out that in most countries the supply of fibres such as sun-hemp, aloepina, ramie plantain, palmyra etc., are not fully utilised. They offer wide scope for the production of many goods like twines, ropes, fishing and other netting materials, mats and floor coverings and cloth.

In evolving suitable techniques for the production of various fibre goods specially designed machinery is required. In most countries such machines can be manufactured.

It is suggested that those countries may consider the desirability of requesting a technical team of two fibre experts from the United Nations Technical Assistance Programme to survey the resources, and make recommendations to modernise existing units, utilise new fibres, and establish new industries.

Suitable raw materials are available in abundance in most countries for the production of hand-made paper, and the prospects of development are bright.

With regard to pottery, the village potter uses clays available from the nearest sources of supply, without regard to quality, and employs the crude open-fire method of baking. The wares thus produced are rough and extremely fragile. The village artisan losses much in breakage at all stages of the manufacture.

Expert knowledge needed for selection of clays, their proper mixture and the use of modern kilns can best be imparted by one or two technicians operating a demonstration unit.

Jaggery is an important food industry common to many countries of the region. Despite the development of large scale sugar manufacture, jaggery-making from various sweet juices such as sugarcane and palm is extensively carried on as a village industry in Ceylon, India, Pakistan, Indonesia and Thailand. Except in the first three countries, no systematic development on this industry has taken place.

An important source of the supply of the tools used by the farmer and the artisan is the village blacksmith and carpenter.

To modernise agriculture and cottage industries, it is necessary to introduce up-to-date tools such as lathes, drilling machines, welding appliances, bench saws, and moulding and cutting machines. Instruction regarding the best use of these tools, and their proper maintenance, has to be imparted.

As a first step the Secretariat proposes to prepare a report on model workshops for smithy and carpentry to indicate the lines on which Governments might develop programmes to modernise these crafts.

The Role of Plant Protection in Intensive Agriculture

By

E. R. GOPALA MENON.

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The place of Plant Protection in Agriculture.

Protection from enemies is one of the three fundamental requisites for the existence of any living matter, whether plant or animal on the face of the world. The other two aspects, adequate supply of food and adaptation to environment are equally important and the provision of these three primary biological necessities determine the continued existence and development of all living matter. In agriculture, the aspect of food supply and crop nutrition is studied by the Agricultural Chemist and elaborate manuring schedules in respect of different crops and different tracts have been evolved. The suitability and adaptability of crops to environment is dealt with by the Agronomist and Crop Breeder and improved high yielding strains of various crops suitable to different areas have been evolved. Unfortunately, plant protection has remained a neglected subject in our country and our efforts in this direction have been till lately rudimentary and inadequate. It is not often admitted that all the researches and labours of the Agricultural Chemist, Agronomist, Crop Breeder and other Agricultural scientists are set at naught by the incidence of pests or diseases. It is yet to be realised that unless all these three branches of Agricultural science are developed co-extensively our efforts at progress and maximisation of agricultural production will be figuratively speaking attempts to keep a three-legged stool with one leg removed or very short in a position of stable equilibrium. In this connection an incident related by an American entomologist who visited Germany about 20 years ago is worth repetition to indicate how other countries view the question of Plant Protection. Germany grew very little corn but still the American entomologist found a number of laboratories intensively studying all aspects of the pests and diseases of corn. On inquiry he was informed that Germany intended to encourage corn cultivation but before that an organisation was being built up to meet any eventuality in case of the incidence of pests or diseases.

The necessity for Plant Protection.

An attitude of complacency on the part of the intelligentia combined with the proverbial conservation and an ingrained fatalistic outlook of our agricultural population have been mainly responsible for the neglect of Plant Protection in India.

The dislocation of foreign trade and food imports, economic and political upheavals, the world over, during and after the war have thrown us back on our own resources to produce sufficient food for our ever-increasing population—*and we have failed.* We have retrogressively cut down our ration from 16 oz. to 12, from 12 to 8 and now from 8 to 7 oz. of our staple diet, rice. Gigantic efforts have been made and are still in progress costing the State crores and crores of money in the various schemes under the 'Grow More Food' campaign, with no palpable improvement in the overall situation.

It will be worthwhile to analyse the causes of this failure of our efforts. from the view-point of a Plant Protection Scientist. The practice of farming is one of the main causes for the upsetting of the balance of Nature. The more intensively farming is conducted, the greater is the interference with Nature. The use of specially evolved seed material and the practice of heavy manuring schedules to force abnormal yields are still further factors against Nature. And Nature in her attempts to set right the balance reacts by favouring the abnormal multiplication of pests and diseases which subsist on these artificially raised and nurtured crops. We, in our efforts to increase agricultural production are creating exactly theseconditions best calculated to favour the enormous increases of crop pests and diseases. We in our efforts to grow more food are actually and actively, even though unconsciously, partaking in "Grow More Insects" and "Grow More Diseases" campaigns and these have been to a very large extent successful. Tractors and pumpsets, ammonium sulphate, superphosphate and oil-cakes have been fully utilised by insects and diseases and the expected surplus has but gone to feed some additional millions of tiny mouths and significant spores, to make them strong to invade the next crop. The situation has so drastically changed over the last 10 years that we now very seldom hear of any crop that was not threatened by some insect pest or disease. The situation is bound to deteriorate with every passing year unless the Government realises and that quickly, the fundamental importance of Plant Protection as the most vital factor in their scheme of agricultural recovery and food self-sufficiency. The three-legged stool of agricultural progress can never stand stable on its two legs; all the three legs must be equally long and strong.

The Present Organisation and its Achievements.

Since 1949 an organisation with 4 officers and 2 assistants in each district has been set up in this State for plant protection work. This set-up is hopelessly inadequate, considering the vast amount of work. The consolidation of even this meagre staff into an independent section, the creation of a wide and efficient net-work of skilled field-staff in the districts and the provision of mobile units for quick transport of men and materials are three urgent needs if the work of plant protection is to expand. And it is my plea, that all these or atleast a major portion of it could be done, with the resources and staff now in the department, without involving much of extra cost to the Government.

We have during the past 15 months treated about 8,000 acres against the army-worm of paddy, 2,000 acres against the green jassid of paddy, about 4,000 acres against the paddy grass-hopper, and more than 50,000 acres against field rats. Against the outbreaks of other paddy pests like Hispa, Leptispa, Tetroda and Rice-bug an area of nearly 2,500 acres have been tackled. In regard to millets, about 500 acres have been treated against the cholam earhead bug and more than 2,000 acres against the cholam grass-hopper. Brinjals, which is one of the staple vegetables of South India have been treated on nearly 1,500 acres and chillies in over 3,000 acres. Potatoes which are seriously damaged by cutworms and rats in the field have been treated in over 2,000 acres. Nearly 10,000 mango trees and nearly 5,000 citrus trees have been sprayed for various pests. These are only a few of the important items in the work of this section and is by no means exhaustive.

Though the above is a really creditable achievement it has but touched the very fringe of the problem of plant protection. Without a specially trained field staff in every district and without provision of mobile units for the quick transport of men and materials, plant protection can advance but little further than what we have been able to achieve so far.

The Problem of Stored Product Pests.

Closely allied to the problem of crop pests and diseases in the fields is the safe-guarding of the harvested produce in granaries and stores. This causes a most tremendous drain on our food reserves; it needs no emphasis or explanation since it is made so blatantly obvious to every ration card holder by the frequent issues of rations, far advanced in insect damage. Government storage centres deal only with a small portion of the total agricultural production of the country, the bulk of which is in the villages and no work has been done so far to improve the conditions here. It is an absolute necessity to strengthen this aspect of plant protection to ensure a balanced agricultural economy.

Legislative Measures as aids in Plant Protection.

Before closing the subject, there is another important aspect of plant protection, namely, the role of legislative measures as aids in this work, which needs consideration. The adoption of control measures in a large area, at times of insect outbreaks is sometimes seriously impeded and very often completely obstructed by the perversity of a few isolated individuals who by their refusal to adopt any measures, lead not only to the destruction of their own crops but afford fertile centres for fresh infection. It is urgently necessary that such individuals should be prevented from indulging in this sort of unsocial acts and in Madras we have an effective instrument to prevent them in the Pests and Diseases Act of 1925. It is highly necessary and even imperative that the provisions of the above Act should be enforced in respect of every major pest of every crop in this State. Of course such an action will be unpopular; compulsion in any form is always unpopular but it has to be resorted to for the general good and welfare of the public. The fact of having the Act promulgated does not mean that we desire to indulge in indiscriminate prosecutions and harrassments but for the field worker it is always helpful to have such a measure in the background.

A fresh legislative Act is necessary in respect of stored food products. It is agreed on all hands that stored food losses due to insects, both in quantity and quality are enormous.

It is the prime duty of the State to interfere and rectify such an obvious case of mismanagement and minimise this sort of preventible waste. At present the State is helpless to compulsorily prescribe any safety measures or enforce any standards for ensuring correct storage. It is quite essential that a legislative Act should be passed in this respect.

Conclusion.

Intensive cultivation to maximise our agricultural production is an absolute necessity and will be of more and more importance to our national economy with every passing year. The efforts made so far have not had the amount of success commensurate with the expenses incurred and the labour expended. This is principally due to the non-recognition of the enormous waste caused by insect pests and diseases in the field and in the stores. In our efforts to feed our increasing millions we are but feeding increasing millions of insects and disease germs. As Sri. K. M. Munshi, Food and Agriculture Minister, Government of India rightly stated recently, 25% of the food production in the country is being wasted because of the carelessness of the cultivator. The easiest and quickest means of attaining food self-sufficiency is to prevent this avoidable waste, which is much larger than the actual deficit. The plant pests and diseases are our dangerous rivals for the food supplies of the world and whether we hope to survive and exist for the next 50 years will depend to a large measure upon the success or failure of a well-planned and organised plant protection service.

(Madras Ag. Journal, Feb. 1951).

FERTILISERS IN THE COMMONWEALTH

A SURVEY OF PRODUCTION AND TRADE

A REPORT recently issued by the Commonwealth Economic Committee and entitled "Survey of Trade in Fertilisers" shows that the Commonwealth consumes about 10 p. c. of the world total of nitrogen, and about 20 p. c. of the world total of phosphate.

SHARE IN WORLD OUTPUT.

In 1938–39 the world output of nitrogen was 2.5m. tons. There was a sharp decrease during the war, followed by a heavy increase, the world total reaching 3.3m. tons in 1948–49. Between 1938–39 and 1948–49, output in the Commonwealth rose two-and-a-half times, and represented 14 p. c. of the world total as compared with 7 p. c. before the war. While the U. K. was responsible far the greater part of the Commonwealth output, and Canada for most of the remainder, production in both Australia and India is increasing rapidly.

Before the war, the world output of phosphate rock was estimated at 13 m. tons; in 1946–47 it was 17 m. tons, rising to 19 m. tons by 1948–49. Although little exploitable rock is found in most Commonwealth countries, the deposits on Christmas Island, and the Pacific Islands of Ocean and Nauru provided (pre-war) 1. 3 m. tons.

World production of manufactured phosphatic fertilisers was estimated at 5 m. tons (P_2O_5 content) in 1948-49, as compared with 3.5 m. tons in 1938. Before the war, the Commonwealth contributed about 15 p. c. of the total, and nearly 20 p. c. thereafter, mainly in the form of superphosphate production in the U. K., Australia and New Zealand. In terms of P_2O_5 Commonwealth output rose by about 85 p. c. from 1938 to 1948-49.

Estimated world production of potash for fertiliser purposes was 3.2 m. tons in 1948-49 as compared with 2.7 m. tons in 1938 (both figures exclude the U. S. S. R.) The Commonwealth, as yet, produces only minute quantities in Australia and South Africa.

EXPORT AND IMPORT TRADE.

Broadly speaking, the Commonwealth is a net exporter of nitrogen, but an importer of phosphate and potash. In 1948-49, only two Commonwealth countries, the U. K. and Canada, exported nitrogen in significant quantities; India was the largest importer, followed by the Colonial territories. All Commonwealth countries imported phosphate, but the very large exports of ammonium phosphate from Canada together equalled about a third of the Commonwealth's total imports. The principal importer of potash was the U. K., Canada took most of the remainder.

In 1948 the total value of fertiliser imports into Commonwealth countries, other than Colonial territories, was L.26.8 m., and of exports L17.9 m. (after taking account of exports of phosphate rock from Nauru, Ocean and Christmas Islands to Australia and New Zealand of about L1.5 m.), giving a net import balance of L8.9 m. The U. K. took 52 p. c. of the imports, mainly in the form of potash, rock phosphate and superphosphate, India took 14 p. c., Canada, 9 p. c., Australia, 7 p. c., New Zealand and South Africa 6 p. c. each; and Ceylon, 5 p. c. Canada was the principal exporter with 50 p. c. of the total followed by the U. K. with 38 p. c.

CANADA AND AUSTRALIA.

The fertiliser industry is becoming increasingly important in Canada. Total consumption in terms of plant nutrients increased heavily during the war and has continued to rise. Exports and imports have increased since 1938. Fertilisers have become a moderately important item of the total value of Canadian exports; the U. S. is the principal customer and the principal source of the imports.

Apart from comparatively small quantities of ammonium sulphate and slag, the output of chemical fertilisers in Australia is almost entirely superphosphate made by treating imported rock phosphate with domestically produced sulphuric acid. Before the war Australia's phosphate rock requirements were met almost entirely from the British Phosphate Commission's workings on Ocean and Nauru Islands, and this supply, interrupted during the war, has now been resumed. Indigenous rock was mined during 1941-45, but the quantities were small and the quality poor. Increasing amounts of sulphate of ammonia are being produced at Government synthetic ammonia plants.

Domestic production of ammonium sulphate is expected soon to be sufficient for requirements, and may also serve ultimately to reduce the demand for imported sodium nitrate. The projected expansion of phosphate rock production by the British Phosphate Commission is expected to be ample to meet increased future demand; local production of sulphuric acid is also being greatly expanded.

NEW ZEALAND CO-OPERATIVE PROJECT.

Production of fertilisers in New Zealand, which is mainly in the form of the manufacture of superphosphates from imported rock phosphate, recovered by 1946 from the low levels to which it had sunk during the war and it has since continued to rise. In normal times, the rock phosphate supplies are obtained almost entirely from Ocean and Nauru Islands and since output there has been resumed, requirements are again being met.

Important plans for developing New Zealand's hill country, announced in 1949, included the provision of special aircraft for top-dressing and the erection of new fertiliser works. The New Zealand Meat Producers' Board has expressed its willingness to lend, from accumulated stabilisation funds, a substantial part of the capital necessary for the erection of a new co-operativew orks.

Production of fertilisers in South Africa is principally in the form of superphosphate from imported rock and both indigenous and imported sulphur; some rock phosphate is mined but no potash. South Africa is primarily an importer of phosphates; exports are small—mainly of superphosphate to Southern Rhodesia—5,000 tons before the war, rising to 22,000 tons in 1948. Superphosphate production is being increased.

FERTILISERS IN INDIA.

The principal chemical fertiliser used in India in ammonium sulphate, of which a quarter was domestically produced and three-quarters imported in 1949. Average imports in the four years 1946-49 were about 75 p. c. higher than before the war. The U. K. supplied nearly all the ammonium sulphate in 1946, but this share declined to one-third of the total by 1949. During 1949 special arrangements were made for the import of about 4,00,000 tons of ammonium sulphate for delivery during the two years 1949-50 to meet the requirements of the "Grow more Food" campaign. Sodium nitrate, insignificant until 1946, rose in three years to one–sixth of the total; imports of phosphate also rose.

Before the war, India produced very little in the way of artificial fertilisers of any kind. In 1943 the Foodgrains Policy Committee estimated that India (undivided) would require at least 2 M. tons of artificial fertilisers a year and recommended that, as a first step, immediate action be taken to establish production of nitrogenous fertilisers at the rate of 3,50,000 tons a year. Investigations were put in hand, and in 1944 a technical mission from the United Kingdom reported upon the problem. The Government of India decided to erect at Sindri, in Bihar, a large plant with an ultimate capacity of 3,50,000 tons of sulphate of ammonia a year. Production is expected to commence early in 1951, at about 1,00,000 tons a year, rising to the target figure in three or four years. The Government of Mysore has contracted for construction of a fertiliser plant at Bhadravati with an annual production of 25,000 tons of ammonium sulphate and 25,000 tons of superphosphate. Production should begin in two years.

General development schemes for bringing more land under cultivation and raising production levels are under way in Pakistan. Price and lack of knowledge have in the past been the reasons for the small use of fertilisers, but several provincial Governments have started schemes for subsidising the use of ammonium sulphate and for educating farmers by demonstration and publicity. The U. K. is the principal supplier of ammonium sulphate. The necessary raw materials for its manufacture are available in Pakistan and the Government is considering a scheme for establishment of a large plant in West Pakistan.

CEYLON AND S. RHODESIA.

Ceylon is not yet a producer of chemical fertilisers, but progress is being made toward the manufacture of nitrogenous fertilisers. Production is expected to commence during 1952, and the planned output is intended to meet the Island's requirement of 80,000 tons of ammonium sulphate and 35–40,000 tons of phosphatic fertilisers annually.

Southern Rhodesia does not produce chemical fertilisers in appreciable quantities. Two factories make fertiliser mixtures from imported raw materials, part of this production being exported to Northern Rhodesia and Nyasaland.

FACTS THAT INTEREST

Remove Carbon with Rice.

A speedy method of removing carbon deposits from combustion chambers without taking off the cylinder head has been developed by Oldsmobile Div., General Motor Corp. Rice, under air pressure, is introduced into the chamber through the spark-plug hole. The rice chips off the carbon deposits and thoroughly cleans all surfaces. About 4½ min. is all that is required for each chamber

British Speech Visualizer.

Recent British patent described a device that will enable deaf people to read speech by means of two-dimensional pictures of sounds.

Speech waves from a telephone line are fed to a balanced modulator, together with a locally generated carrier. Side-bands are passed through a narrow-band filter to an amplifier-rectifier whose output varies the brightness of a cathoderay tube.

The carrier is swept through a range of frequencies so the incoming speech signal is scanned. Spot brightness on the tube varies in proportion to power component in each frequency band.

The tube is rotated to present fresh screen, while the beam deflection (at right angles to the screen travel) is locked to the frequency of the local oscilators. The persistence of the tube screen thus enables a two-dimensional pattern, corresponding to groups of syllables, to appear.

Sound Waves Sweep Harbor.

Supersonic sound waves are being used to locate under-water harbor obstacles in the Chicago area. This method requires less time and fewer men, assures greater accuracy, and provides an automatic record of the sweeping.

Three outboard oscillator units were used simultaneously in conjunction with a single recorder. The oscillator units were mounted abreast of each other on a catamaran. One unit was suspended between the two outriggers; the others hung from their outer sides.

New Chemicals Developed for Difficult Applications.

Lower costs, better end products are the objectives of most new commercial chemicals. Here are a few:

Nearly every paper mill using rosin has had sizing problems, especially on hard-sized sheets. One solution is to adopt a more expensive modified rosin or equally expensive beater odditives.

Another solution is offered by Monsanto Chemical Co. with its new Mersize CD-2—a synthetic resin designed especially for paper sizing. Resin is easy to use, is inexpensive, and imparts greater temporary wet strength and lesser degree of feathering as measured by the ink-flotation test.

Durable wrinkle and shrink resistance to cotton and viscose rayon fabrics is promised by Zeset, a new material just developed by E. I. du Pont de Nemours & Co. It also gives both fabrics a soft, wool-like finish. The finish can be applied by any mill having efficient padding, drying, heat-treating and washing equipment used in applying thermosetting resins.

Silicone-rubber parts can be made easier and with highly improved mechanical and thermal properties with a new silicone rubber compound announced by General Electric Co. Designated as 8,1223 compound, the silicone rubber should open up more applications, such as diaphragms, boots, sleeves, belting and mountings.

Ages Cheese Faster.

Adding filbert nuts to cheese ages it in a few days the equivalent of 2-3 months of ordinary aging. The proteolytic enzymes in the nuts do the job. They also give the cheese the sharp, tangy flavor found only in cheeses made from raw milk.

Sulphite Liquor for Roads.

Dusty unsurfaced roads can be made pleasant driving by treating them with sulphite waste liquor from paper mills. Flambeau Paper Co., Wis., finds it an easy way to dispose of its waste liquor.

Something for Gall-stones.

Ultrasonic energy has proved useful in breaking up gall stones inside dogs and rabbits. But this technique, announced by Yale University's School of Medicine, has not yet been tried on humans.

Arithmetic Shortcuts.

To square a whole number plus $\frac{1}{2}$, add $\frac{1}{4}$ to the product of the number by itself plus one. Thus, $2\frac{1}{2} \times 2\frac{1}{2} = 2 \times 3$ plus $\frac{1}{4} = 6\frac{1}{4}$. To get the product of two consecutive numbers ending in $\frac{1}{2}$, square the larger whole number and subtract $\frac{1}{4}$. Thus, $19\frac{1}{2} \times 20\frac{1}{2} = 20 \times 20\frac{1}{4} = 399\frac{3}{4}$.

More Machines, More Work.

A recent study by the Michigan Tool Co. reveals that every year that the installation of industrial equipment increased there was an increase in employment. Every year in which there was a decrease of installation of equipment there was a decrease in employment.

Concentrated Milk.

Not condensed, evaporated or dehydrated, but concentrated milk has gone on the market recently in Delaware. Concentrate is available either frozen or liquid. Frozen concentrate process is similar to the one used for fruit juices.

X-ray Protection.

Lead-glass garments for X-ray technicians, inspectors, doctors and dentists protect arms, shoulders and lower legs. The cloth is lighter than the heavy lead-rubber approns commonly used.

Electric Pressure Cooker.

Unit consists of electric stove with high and low brown indicator on cooking dial, 60-min. timber, and 4-qt. saucepan. Unit automatically exhausts air inside cooker, reduces heat when right pressure is reached, cuts off electricity at end of cooking period, and vents itself slowly.

Ultrasonics Remove Scale.

Limestone scale in boilers, water-heaters, air-conditioning systems, and similar devices can be removed and prevented by ultrasonic waves generated by Crutex unit. Freqency is 27,000 c. Impulses are generated by condenser discharge causing magneto-strictive material to oscillate.

Protects Wood Surfaces.

Plastic coating, trade named Aroflint, is hard, flexible and chemical resistant. It contains no drying oils or nitrocellulose, but cures through action of catalyst stirred into product prior to use. Suggested uses: floors, furniture, sporting goods, industrial equipment, ship woodwork.

Pilotless Jet.

Details of the new Australian pilotless aircraft, recently released by the Society of British Aircraft Constructors, indicate that it is the smallest jet machine ever built.

Its fuselage is 22 ft. long, the wing-span is under 20 ft. and the power plant, a British-built Armstrong-Siddeley Adder is the smallest engine yet built in England. With a diameter of only 28 in. and weight of 550 lbs. it has a thrust of 1,100 lb.

The research jet was built in Australia to specifications prepared jointly by the British Ministry of Supply and Australian engineers.

First two versions of this pilotless missile will actually carry a pilot and will test radio-control equipment. Ultimately it is planned to produce a small high-speed guided missile for fighter and anti-aircraft interceptor training.

Final versions will probably follow the design of the prototypes, and will be capable of flights at very high speeds and high altitudes. These later versions will be powered by an Armstrong-Siddeley Viper which will be the first 'expendable' jet engine. The engine and aircraft are termed 'expendable' because the missiles will automatically destroy themselves when hit by anti-aircraft fire or fighter guns.

Novelties in Alarm Clocks.

A new range of very small and streamlined mechanical alarm clocks, an inexpensive electric alarm and several new nursery alarms will be exhibited by a British firm at this year's British Industries Fair, to be held in London and Birmingham from April 30 to May 11. The firm, which is one of the world's largest producers and exporters of clocks and watches, will also show a new range of wrist watches as well as a selection of minute timers for industrial and domestie use.

New TV Camera.

Test-pattern cards and boards upon which television cameras are focussed for transmission testing purposes, are shortly to be superseded by a new type of camera which has a full-range test pattern engraved on the face of the pick-up tube. Eight of these cameras have been ordered by the B.B.C. from the designers and manufacturers. a British firm, These new cameras will be used for testing, and the test pattern transmitted will always maintain the same standards and fidelity.

Woman Racing Driver.

First woman driver in a post-war racing team, 25-year-old Olga Kevelos, of Birmingham, will be the official woman driver in the newly formed Kieft 500 c. c. team which will race in Britain and abroad. Cyril Kieft, of Swansea, is using young drivers in his bid to "put Wales on the motor-racing map", and he selected Olga because of her courage and determination. The only woman rider in the 1949 Six-Day Motor-Cycle Trial, Olga later switched to cars, and came second in the Ladies' Race at Brands Hatch, in a car lent by one of the men drivers.

News & Notes

New Coalfield Discovered in U.K.

A new coalfield has been discovered in Britain by experts of the National Coal Board. It is at Rugeley, near Stafford. Disclosing this, Lord Hyndley, Chairman of the Board, says that it should yield about 20,00,000 tons of coal a year when it reaches its full output. It will be equipped with (the most modern types of mining equipment at a cost of £10,00,000 (Rs. 1.33 crores).

Sulphuric Acid Plant.

Substitution is a promising line of development for Britain, which produces few of its raw materials and therefore cannot directly raise production.

It may, for example, yet provide the answer to the sulphur shortage, which is the most threatening of all. But it takes a long time to convert the existing plants to using alternative materials such as pyrites. Imperial Chemical Industries have built a plant to produce 2,50,000 tons of sulphuric acid a year from anhydrite, a mineral found in the U. K. But such a switch-over from using natural sulphur (available only from the U.S.A.) would be slow and costly, for an anhydrite plant with an output of 1,50,000 tons of sulphuric acid a year is estimated to cost more than £30,00,000.

In the short run the problem is clearly to control the use of scarce raw materials for essential purposes and to share the reduced supplies by intelligent international agreement.

Inquiry into Rubber.

With the object of removing misapprehensions which appear to exist in regard to the present position of the inquiry about rubber, a Commerce and Industry Ministry press note says that the Tariff Board was asked to investigate the cost of production of rubber and advise the Government as to the prices to be fixed for the various grades of raw rubber. The question of allowing an "ad interim" increase in the price of raw rubber has been referred to the Rubber Price Advisory Committee consultation with whom is obligatory. The Tariff Board has also been asked to include in its inquiry the question of grant of protection or assistance to the industry. The inquiry is in progress and the government will take decisions after receiving the Board's Report.

Sale of Sulphur.

By a notification published in the "Gazette of India", the Central Government has authorized the Deputy Development Officer (Chemicals) attached to the Ministry of Commerce and Industry to issue a general or special authority to dealers for the sale or disposal of sulphur. Two other notifications published in the "Gazette of India" provide that all stock returns relating to sulphur should hereafter be sent to the above officer.

Manufacture of Straw-Boards.

Investigations carried out at the Forest Research Institute, Dehra Dun, show that the wild-growing ullah grass is an excellent substitute for wheat and rice straws now used in the manufacture of straw-boards. The researches now not only open up possibilities of meeting the increasing demand for raw materials by the straw-board factories, but also for releasing the more nutritious wheat and rice straws for cattle feed. The ullah grass, which is botanically termed Anthisteria Gigantea, grows wildly over hundreds of square miles in the Himalayan sub-montane tract.

Machine Tool Factory.

The Minister for Works, Production and Supply stated in Parliament that the Government of India proposes to set up a machine tool factory with the assistance of a Swiss firm at a capital cost of Rs. 8.37 crores. The factory is expected to manufacture general purposes machine tools, namely, high speed lathes, heavy duty drilling machines and milling machines. The proposed factory will not affect the existing machine tool factories in the country in any way because it is intended to be complimentary to them and not competitive.

Development of Village Industries.

The Government of Madras has approved a scheme for the formation of co-operattve agencies to aid the implementation of the comprehensive scheme sanctioned already for the development of village industries. The government had last year sanctioned an ambitious scheme envisaging the distribution of a few models of improved labour-saving tools to enterprising artisans free of cost, and the storage in the villages of sufficient quantities of raw materials for sale to artisans at cost price throughout the year. The storage and distribution of tools, implements and raw materials had hitherto been attended to by the Rural Welfare Officers. According to the new scheme, the procurement, distribution and storage of the implements and raw materials will vest with co-operative agencies. Twenty-five firkas, at the rate of one in each district, have been selected for the working of this new scheme.

New Rust-Resistant Grain Evolved.

Hybrid crossed with Indian Wheat-Pusa III.

After 20 years of experimental work involving the breeding and testing of more than 1,000 varieties of wheat and 8,000 hybrids, a new variety of wheat highly resistant to stem rust has been evolved at the State Government's experimental farm at Glen Innes, New South Wales.

As soon as enough seed is available the new variety—which is not yet officially named but may be tentatively called B.K.P.—will be grown on a commercial scale.

The story began in 1929 when three varieties of wheat were imported from Kenya, East Africa. These were tested with 1,000 other varietes, at Glen Innes-

One proved promising, as its resistance to stem rust was high. It was crossed in 1930 with Baringa, an Australian wheat then grown on a considerable scale. Although it yielded well, Baringa was later dropped by wheat growers because the flour from this wheat was not regarded as being of good baking quality. In other ways the Kenya-Baringa cross was excellent, but it had the flour defect found in Baringa.

Crossed with Indian.

The Kenya-Baringa hybrid was therefore crossed with an Indian wheat, Pusa III, which yields flour of high baking quality. The result was the new variety. This has the Kenya wheat's resistance to stem rust, the high yield that marked Baringa, and the high baking quality of Pusa III.

In 1950 more than 40 bushels of seed of the new strain were produced at the Leeton, New South Wales Experimental Farm. Dr. S. L. Macindoe, principal research agronomist of the New South Wales Department of Agriculture, said recently that there was no doubt about the value of the new variety. It was now a question of growing enough seed.

Private Help Given.

The breeder of the new wheat, Dr. Macindoe said, was Mr. W. V. Single, plant breeder at the Glen Innes farm. Great credit was also due to a number of wheat farmers in the north-west of New South Wales, who had for years given Mr. Single and other plant breeders great assistance in their work. The new wheat would be distributed to these farmers for growing. Bags of seed would also be distributed to other New South Wales wheat farmers who agreed to comply with the Department's conditions for growing the new variety.

Dr. Macindoe said that the straw of the new variety was of fine quality. It threshed easily and the finish of the grain was excellent.

No seed was yet available for sale, or for general distribution, said Dr. Macindoe.

Waste timber used in making plywood.

The production of plywood from waste timber is being developed in Australia by the Forest Products Division of the Commonwealth Scientific and Industrial Research Organisation. The local industry has been experiencing a shortage of suitable Australian timber, and has recently been compelled to import large quantities of logs. Large resources of veneer-quality timber from ash-type eucalypts are available in South-eastern Australia, but difficulty in drying the veneer has prevented its extensive use. Timber of this type is very susceptible to collapse and the veneer also buckles during the drying process. Some of the difficulties have been overcome by correct peeling, by drying under carefully-controlled conditions, and reconditioning the dry veneer with a special steam treatment.

The Division's cold dip treatment for protecting susceptible veneers against attack by the powder post beetle, has brought into use, for the manufacture of ply, many timber species previously rejected by millers as being too susceptible to borers.

Soil moisture content measured by apparatus.

A new Australian invention to enable more scientific and economic irrigation in orchards has been developed in Adelaide, Australia, by scientists of the Waite Institute. It is based upon an American idea whereby an electric current is passed through gypsum blocks placed at varying depths in the soil.

Variations in soil moisture are reflected in the resistance to the current. When connected to a switchboard the apparatus will give rapid and accurate estimate of the amount of soil water available to plants.

Chemical Industry grew considerably.

Since the outbreak of World War II, there has been a rapid and substantial growth in Australia's chemical industry. Defence needs in the first place and then the needs of Australia's expanding secondary industries contributed to the growth.

In the year 1938-39 there were 666 chemical factories employing 19,943 workers. By 1948-49 these figures had increased 51.6 per cent to 1,010 factories and 67.2 per cent to 33,355 workers.

During that period, the production of sulphuric acid increased 19% to 5,85,000 tons. Superphosshate production increased 18.7% and ammonium sulphate production increased to 118.9%.

In 1950 a very large alkali plant (utilising salt recovered by solar evaporation of sea water) came into operation in South Australia, producing soda ash, caustic soda, bicarbonate of soda and calcium chloride. By 1948-49 production of caustic soda was 390% higher than before war.

Wartime and postwar expansion includes: phosphorous, phosphoric acid, soluble phosphates, diatomaceous earth, chromium compounds, ammonium chloride, nitrobenzene, anilinei chlorosulphonic acid.

In 1946 began manufacture of acetylene black which is extensively used in manufacture of dry batteries.

Independent supplies of sulphur sought.

The Australian Government has discussed with local manufacturers of sulphuric acid, plans for making Australia substantially independent of external sources of supplies of sulphur. Government also conferred with representatives of mining companies who are producers of sulphur and sulphur-bearing materials, and discussed with them the present acute world shortage of sulphur. Proposals have been made to meet the position by the use of indigenous materials, such as pyrite, and the recovery of sulphur as a bye-product from zinc and lead concentrates. Main producers of pyrite are the Mt. Morgan Co., in Queensland, Mt. Lyell Co. in Tasmania, Lake George Mines in New South Wales, and Norseman Gold Minesin Western Australia.

Meat Byproducts as Source of Better Living

New uses of the byproducts of meat animals are being developed by the American Meat Institute Foundation, Chicago. The products derived from livestock are contributing to improved health, industrial progress, and better living in the United States.

Medicines and glandular extracts from meat are used to correct bodily deficiencies and provide relief from illness. Two of the latest wonder drugs—ACTH, made from the anterior lobe of a hog's pituitary gland, and Cortisone, made from the adrenal gland of cattle—are among the most important recent discoveries. These are used in the treatment of arthritis and other ailments.

Insulin, made from animal endocrine glands, is used by diabetic sufferers. New techniques to develop the vitamin B12 content of meat and meat products are also being discovered. Studies reveal that cattle livers and kidneys are excellent sources of this vitamin.

Byproducts used in foods come from various parts of animals. Fats are used in candies and chewing gum. The residue from cooking fats used to produce soap—called tankage—makes good fertilizer and also can be converted into hog and poultry feed.

From hog grease has come a new chemical used in synthetic rubber. Lard is used in making facial ointments and creams.

Hair from the ears of cattle is made into artists' brushes and pig bristles are used in tooth brushes. Hair from the tails of cattle is used as an air filter in tractors.

From the skeletons of animals come buckles, chessmen, crochet needles, hairpins, and umbrella handles. India ink is made from charred bones, violin strings from sheep intestines, and clothing from hides and wool.

The Foundation is a nonprofit organization, supported by more than 500 meat packing companies in the United States. Affiliated with the University of Chicago, its laboratories include a pilot plant, where production and stability of products under controlled conditions are studied, and a fat extraction room. A special project laboratory is used to study the nutritive values in bone and meat scrap, tankage, and other meat packing byproducts. A fully equipped home economics kitchen provides facilities for research in connection with cooked products.

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